United States
Department of
Agriculture

Forest Service

Tongass National Forest

R10-MB-504

September 2004

Emerald Bay Timber Sale

Draft Supplemental Environmental Impact Statement

United States Department of Agriculture
Forest Service
Alaska Region
Tongass National Forest
648 Mission Street
Ketchikan, AK 99901
907-225-3101
FAX 907-228-6215

File Code: 1950
Date: September 1, 2004

Dear Planning Participant:

Enclosed is the Draft Supplemental Environmental Impact Statement (Draft SEIS) for the Emerald Bay Timber Sale in the Tongass National Forest. The entire Draft SEIS is included in one document, which describes one no-action alternative and three action alternatives ranging from 24,359 to 32,749 CCF (12-16 million board feet) of harvest. Proposed harvest methods range from a mix of traditional clearcutting to all uneven-aged management. My preferred alternative at this point is Alternative B which emphasizes traditional clearcutting and uneven-aged management.

The Emerald Bay Timber Sale Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) were published in October 2001. On February 14, 2002, the Tongass Forest Supervisor's decision was reversed on appeal to the Regional Forester because the FEIS did not adequately consider the potential effects of the project on roadless area values and wilderness characteristics. This Draft SEIS includes more detail on the potential effects of the project alternatives on these resources.

The National Environmental Policy Act provides for a 45-day public review/comment period for a Draft EIS. Comments for the Emerald Bay Timber Sale must be submitted in writing and postmarked no later than 45 days after the Notice of Availablility is published in the Federal Register. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the Final SEIS, thus avoiding undue delay in the decision-making process. Comments on the Draft SEIS should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3). I expect the Notice of Availability to be published on October 1, 2004. Please send written comments to:

John Natvig
USDA Forest Service; TEAMS Enterprise
Attn: Emerald Bay
P.O. Box 241
Fort Meade, SD 57741

Your input will be used to prepare the Final SEIS and Record of Decision. If you have questions please contact John Natvig (605) 720-7710. Your interest in the management of the Tongass National Forest is appreciated.

Sincerely,

FORREST COLE
Forest Supervisor

Emerald Bay Timber Sale

Draft Supplemental Environmental Impact Statement

United States Department of Agriculture
Forest Service Alaska Region
Tongass National Forest

Lead Agency: USDA Forest Service
Tongass National Forest

Responsible Official: Forest Supervisor
Tongass National Forest
Ketchikan, AK

For Further Information Contact: Jerry Ingersoll, District Ranger or
Pat Haley, Team Leader
Ketchikan/Misty Fiords Ranger District
Tongass National Forest
3031 Tongass Avenue
Ketchikan, Alaska 99901

Abstract

The USDA Forest Service proposes to harvest approximately 24,359 CCF (12,179 MBF) of timber in the Emerald Bay project area, Ketchikan-Misty Fiords Ranger District, Tongass National Forest. The Emerald Bay project area is on the west side of the Cleveland Peninsula. Timber volume from this project would be sold in one sale. The actions analyzed in this Draft Supplemental Environmental Impact Statement (Draft SEIS) are designed to implement direction contained in the Tongass Land and Resource Management Plan.

The Emerald Bay Timber Sale Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) were published in October 2001. On February 14, 2002, the Tongass Forest Supervisor's decision was reversed on appeal to the Regional Forester because the FEIS did not adequately consider the potential effects of the project on roadless area values and wilderness characteristics. This Draft SEIS includes more detail on the potential effects of the project alternatives on these resources.

The Draft SEIS describes four alternatives, which provide different combinations of resource outputs and spatial locations of harvest units. Alternatives B and D propose roading through a medium Old-growth Reserve (MOGR) and construction of a log transfer facility. The alternatives include: A) No Action, proposing no harvest or road construction from the project area at this time; B) maximizing the contribution to the timber products industry through application of predominantly even-aged management and construction of 6.2 miles of new road; C) minimizing impacts to MOGR through uneven-aged management and 100 percent helicopter yarding. No roads would be constructed; D) balancing timber economics and resource protection through use of uneven-aged

management and 3.8 miles of new road. Roads in Alternatives B and D would be constructed to minimize impacts. Roads and the log transfer facility would be closed upon completion of the timber sale.

The Forest Service Preferred Alternative for this Draft Supplemental Environmental Impact Statement is Alternative B.

Reviewers should provide the Forest Service with their comments during the review period of the Draft SEIS. This will enable the Forest Service to analyze and respond to the comments at one time and to use the information acquired in the preparation of the Final Supplemental Environmental Impact Statement (Final SEIS), thus avoiding undue delay in the decision making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewer's position and contentions. (Vermont Yankee Nuclear Corp. v. NRDC, 435 U.S. 519, 553(1978)). Environmental objections that could have been raised in the draft stage may be waived if not raised until after completion of the final environmental impact statement. (City of Angoon v. Hodel (9^{th} Circuit, 1986)) and (Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980)). Comments on the draft supplemental environmental impact statement should be specific and address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

Send Comments to: John Natvig, USDA Forest Service TEAMS Enterprise
Attn: Emerald Bay
P.O. Box 241
Fort Meade, SD 57741

The comment period closes 45 days after the Notice of Availability is published in the Federal Register.

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Introduction

In compliance with the National Environmental Policy Act (NEPA) and other relevant State and Federal laws and regulations, the Forest Service has prepared this Draft Supplemental Environmental Impact Statement on the potential effects of timber harvest in the Emerald Bay project area. The project area is located on the Cleveland Peninsula, and is within the Ketchikan–Misty Fiords Ranger District, Tongass National Forest, Alaska (see Figure 1-1). Previous efforts to schedule timber harvest on the Cleveland Peninsula have met with varying degrees of local and even national interest and controversy, issues that were also considered in this analysis.

The Emerald Bay Timber Sale Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) were published in October 2001. On February 14, 2002, the Tongass Forest Supervisor's decision was reversed on appeal to the Regional Forester because the FEIS did not adequately consider the potential effects of the project on roadless area values and wilderness characteristics. The Emerald Bay project is within the Cleveland Roadless Area. This Draft Supplemental Environmental Impact Statement (Draft SEIS) includes more detail on the potential effects of the project alternatives on these resources.

This Draft SEIS discloses the environmental effects of management activities proposed in the Emerald Bay project area. This Draft SEIS is subject to a 45-day review and comment period. This provides a new opportunity to review and comment on the Emerald Bay Project. All comments received on the Draft SEIS will be reviewed and addressed in an appendix to the Final Supplemental Environmental Impact Statement (Final SEIS). The Forest Supervisors decision on project implementation will take place upon completion of the Final SEIS and disclosed in a Record of Decision.

Proposed Action

The proposed Emerald Bay timber sale is located approximately 40 air miles north of Ketchikan, Alaska. It is located on the Cleveland Peninsula in the Emerald Creek and Birch Creek watersheds. Access to the area is by small plane originating in Ketchikan or Wrangell or by boat through Ernest Sound.

The project area includes value comparison unit (VCU) 7210. Value comparison units are defined in the Introduction to Chapter 3. For analysis purposes, the project area boundaries are considered to be the same as the VCU boundaries. The VCU boundaries generally follow major watershed divides; however, the southern tip of the project area crosses slightly into the Wasta Creek drainage, which drains into Spacious Bay.

The Forest Service proposes to harvest approximately 24,359 CCF of timber from approximately 620 acres of National Forest System land through one timber sale. Harvest would begin in 2005. Logs would be helicopter yarded from the cutting units to a barge in Emerald Bay. No roads or log transfer facilities would be constructed. Timber would be sold from this project in one sale.

The proposal includes timber harvesting on selected timberlands suitable for the production of sawtimber and other wood products, to help meet market demands for timber, and provide resource production opportunities and employment for local communities. Harvest is expected to improve timber growth and contribute toward a balance of age classes.

Purpose and Need

The Emerald Bay project is proposed to respond to goals and objectives of the Forest Plan, and to help move the project area toward desired future conditions described in that Plan. The project is intended to implement Forest Plan direction for the timber production land use designation (USDA Forest Service 1997) as follows:

- Manage the timber resource for production of saw timber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, long-term sustained yield basis and in an economically efficient manner.
- Seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber, and the market demand for the planning cycle.
- Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska.
- Support a wide range of natural resource employment opportunities within Southeast Alaska's communities.
- Attempt to minimize disturbance in adjoining Old-growth Land Use Designations (LUDs) and minimize fragmentation of roadless areas while still meeting the goals, objectives and desired condition for the Timber Production LUD.
- Provide local employment opportunities in the wood products industry, consistent with providing for the multiple use and sustained yield of all renewable forest resources

Appendix A of this Draft SEIS provides additional rationale for why the Emerald Bay project area was selected for analysis at this time. Further clarification can be found in the next section regarding this project's relationship to the Forest Plan.

Land Use Designations

The Forest Plan includes area-specific goals, objectives, and desired future conditions. The Forest Plan uses land use designations to guide management of National Forest System lands within the Tongass. The Emerald Bay project area includes two LUDs: Timber Production and Old-growth Habitat.

Timber Production

The desired future condition for the Timber Production LUD includes healthy stands in a balanced mix of age classes from young to harvestable. The goals of this designation are to: 1) maintain and promote industrial wood production from suitable timber lands, providing a continuous supply of wood to meet society's needs; 2) manage these lands for sustained long-term timber yields; and 3) seek to provide a supply of timber from the Tongass National Forest which meets the annual and planning-cycle market demand, consistent with the standards and guidelines of this LUD.

Applicable objectives include:

- Improve timber growth and productivity on commercial forest lands.
- Plan, inventory, prepare, offer, sell, and administer timber sales and permits to ensure the orderly development of timber production.
- Seek to reduce clearcutting when other methods will meet land management objectives.

Old-growth Habitat

Within areas allocated to the Old-growth Habitat LUD, the desired condition is that all forested areas attain old-growth forest characteristics and provide a diversity of Old-growth Habitat types. The primary goals of the Old-growth Habitat LUD are to: 1) maintain areas of old-growth forests and their associated natural ecological processes to provide habitat for old-growth associated resources; and 2) manage early seral conifer stands to achieve old-growth forest characteristic structure and composition based on site capability (Forest Plan, p. 3-76).

Applicable objectives include:

- Provide old-growth forest habitats, in combination with other LUDs, to maintain viable populations of... fish and wildlife species... that may be closely associated with old-growth forests.
- Contribute to the habitat capability of fish and wildlife resources to support sustainable human subsistence and recreational uses.
- To the extent feasible, limit roads, facilities, and permitted uses to those compatible with old-growth forest habitat management objectives.

Issues Associated with the Proposed Action

Issues for the Emerald Bay project were identified through public and internal scoping. The following two issues were determined to be key and within the scope of the project decision. These issues are addressed through the Proposed Action and alternatives.

Timber Economics and Supply

This issue encompasses public concern over:

- the amount of timber available and proposed for harvest,
- the methods of timber harvest,
- whether or not timber harvest should take place,
- balancing timber production with other forest uses,
- how the project contributes to the long-term timber supply, and
- cost-effective timber harvest.

Roadless and Road Construction

This issue is construction of roads into areas available for timber management but currently unroaded, and management of those roads following timber harvest. The impacts of the Proposed Action and action alternatives on the Cleveland Peninsula Roadless Area's values and wilderness characteristics are main concerns in this issue. Road building through a medium Old-growth Reserve is also a concern. As the project analysis progressed, many people expressed the desire to see the Cleveland Peninsula remain unroaded while others objected to both roading and timber harvest.

Comparison of Alternatives

This section compares outputs, objectives and effects of the alternatives in terms of the significant issues for the Emerald Bay project. The discussions of effects are summarized from Chapter 3; for a full understanding of the effects, Chapter 3 should also be read. Table S-1 provides an overview comparison of information from the alternative descriptions. This information will be used in the discussions which follow.

Table S–1
Comparison of Action Alternatives—Outputs, Objectives and Effects

Category	Unit of Measure	Alt A	Alt B	Alt C	Alt D
Harvest Method					
Clearcut	acres	0	396	0	0
Single-tree Selection	acres	0	205	561	561
Group Selection	acres	0	0	59	59
Harvest Volume	CCF[1]	0	32,749	24,359	24,783
	MBF[2]	0	16,373	12,179	12,391
Harvest Units					
Number of Units	#	0	8	10	10
Average Unit Size	acres	0	75	62	62
Harvest System					
Long Span Cable	acres	0	75	0	0
Short Span Cable	acres	0	299	0	0
Helicopter	acres	0	218	620	609
Shovel	acres	0	9	0	11
Roads					
New Construction	miles	0	6.2	0	3.8
LTF Construction	#	0	1	0	1
Economics					
Average Harvest Cost	$/CCF	0	$179	$403	$232
Net Stumpage Value[3]	$/CCF	0	$48	- $189	-$29
Employment	jobs/year	0	86	64	65

[1]CCF = hundred cubic feet
[2]MBF = thousand board feet
[3]at current market prices
Source: M. North

Alternative A proposes no timber harvest, and thus offers no opportunity for timber-related employment or personal income. Alternative B would result in timber-related employment opportunities while Alternatives C and D would not likely sell under current market conditions and would not result in timber-related employment. Alternative B offers the most timber volume (32,749 CCF) and generates the highest potential number of jobs (86).

Alternative B, with 6.2 miles of road construction and conventional harvest, has the lowest average overall cost ($179 per CCF). Alternative C, with no new roads and 100 percent uneven-aged management prescriptions, has the highest average cost, which, at $403 per CCF is substantially higher than the other action alternatives. These costs are largely related to long-distance helicopter yarding. Alternatives B and D reduce helicopter yarding distance through road construction, and Alternative B proposes conventional yarding methods (shovel and cable). Alternative D proposes 3.8 miles of low-impact road construction and costs fall between those of Alternatives B and C, at $232 per CCF.

Alternatives B and D both construct one log transfer facility (LTF). Alternative B constructs 6.2 miles of new, low-impact road, while Alternative D constructs 3.8 miles of new, low-impact road. Both alternatives propose 2.2 miles of road through a medium OGR. Alternative A has no new road construction or harvest. Alternative C does not propose road construction.

Alternative B utilizes traditional even-aged silviculture systems with 100-year rotations on 396 acres. Uneven-aged management with single-tree selection harvest methods would occur on

205 acres. Alternatives C and D would emphasis uneven-aged management with single-tree or group selection on all harvest units.

Roads in Alternatives B and D would be constructed to minimize impacts. Road width would be 14 feet, and the surface would be outsloped, with no ditch except in turnpike areas. Log-stringer bridges would be used to cross drainages, and culverts would only be used for crossdrain area. Roads and the log transfer facility would be closed following completion of the timber sale. Closure would include: log-stringer bridge removal and storm proofing (water bar construction). The first section of the road, within beach sight distance, would be obliterated through the placement of debris, such as rocks, root wads, and large wood pieces, on the road surface. Debris would also be placed on the LTF site.

Preferred Alternative

The Forest Service Preferred Alternative for this Draft Supplemental Environmental Impact Statement is Alternative B. Alternative B is currently the only economically viable alternative. The market for timber is substantially weaker than it was 3-5 years ago when the Draft EIS was published. Alternative D was economical under timber market conditions as late as 2001, and Alternative C, while originally only slightly uneconomical, is now even more uneconomical.

Chapter 1
Purpose and Need

Chapter 1

Purpose and Need

Introduction

The Forest Service has prepared this Draft Supplemental Environmental Impact Statement on the potential effects of timber harvest in the Emerald Bay project area in compliance with the National Environmental Policy Act (NEPA) and other relevant State and Federal laws and regulations. The project area is located on the Cleveland Peninsula, and is within the Ketchikan–Misty Fiords Ranger District, Tongass National Forest, Alaska (see Figure 1-1). Previous efforts to schedule timber harvest on the Cleveland Peninsula have met with varying degrees of local and even national interest and controversy, issues that were also considered in this analysis.

The Emerald Bay Timber Sale Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) were published in October 2001. On February 14, 2002, the Tongass Forest Supervisor's decision was reversed on appeal to the Regional Forester because the FEIS did not adequately consider the potential effects of the project on roadless area values. This Draft Supplemental Environmental Impact Statement (Draft SEIS) includes more detail on the potential effects of the project alternatives on these resources.

This Draft SEIS discloses the environmental effects of management activities proposed in the Emerald Bay project area. This Draft SEIS is subject to a 45-day review and comment period. This provides a new opportunity to review and comment on the Emerald Bay Project. All comments received on the Draft SEIS will be reviewed and addressed in an appendix to the Final Supplemental Environmental Impact Statement (Final SEIS). The Forest Supervisor's decision on project implementation will take place upon completion of the Final SEIS and will be disclosed in a Record of Decision.

This Draft SEIS is prepared according to the format established by the Council on Environmental Quality (CEQ) regulations for implementing the NEPA (40 CFR 1500-1508). Chapter 1, in addition to explaining the Purpose and Need for the Proposed Action, discusses how the Emerald Bay project relates to the Tongass Land and Resource Management Plan (Forest Plan), and identifies the issues driving this analysis. Chapter 2 describes and compares the Proposed Action, alternatives to the Proposed Action, and a No-action Alternative. Chapter 3 describes the natural and human environments that could potentially be affected by the Proposed Action and alternatives, and also discloses the anticipated potential environmental impacts of the alternatives. Chapter 4 contains the list of preparers, the distribution list, references, a glossary, and an index. Appendix A discusses the reasons for scheduling the Emerald Bay project environmental analysis now.

The Interdisciplinary Team (IDT) used a systematic approach to analyze the Proposed Action and alternatives to it, estimate the environmental effects, and prepare this Draft SEIS. The planning process complies with NEPA and the CEQ regulations. Planning was coordinated with the appropriate Federal, State and local agencies, and local federally recognized Tribes.

Changes from the 2001 FEIS to the Draft SEIS

In addition to disclosing the potential effects of the project on roadless area values and wilderness characteristics, there are other changes in this document from the 2001 FEIS. These changes were made to address appeal issues, improve the Proposed Action and alternative design, and address concerns related to the analysis identified during the appeal of the 2001 Emerald Bay ROD.

Preferred Alternative

The 2001 Record of Decision for Emerald Bay documented the Forest Supervisor's decision to select Alternative D. In light of current low timber prices, the agency has now identified Alternative B as the preferred alternative.

The Preferred Alternative, Alternative B, would harvest approximately 32,749 hundred cubic feet (CCF), about 16 MMBF, of timber from approximately 601 acres of National Forest System land. This would require 6.2 miles of new road construction and a log transfer facility (LTF).

Purpose and Need

The purpose and need has been revised to emphasize Forest Plan direction in guiding the Emerald Bay project (see page 1-7).

Harvest Unit Modification

There have been slight modifications to harvest unit boundaries based on knowledge of the planning area acquired since the FEIS was published. Modifications made to unit boundaries better reflect on-the-ground conditions and incorporate mitigation measures. Associated changes were made in cutting unit acres, harvest volume, harvest method acres, and harvest system acres. The analysis of the alternatives (Chapter 3) has been updated to reflect the unit changes. Alternative maps in Chapter 2 reflect the modified units.

Environmental Consequences

The effects analysis in Chapter 3 is updated to address concerns identified in appeals of the Forest Supervisor's 2001 decision, in addition to analysis regarding roadless and wilderness values. The main changes in Chapter 3 include:

- disclosure of the effects of the alternatives on coarse canopy forested habitat;
- re-evaluation of the effects of the alternatives on deer habitat using the most recent models, and updated unit information;
- re-evaluation of the financial efficiency and economics of the alternatives based on recent costs and market values.

Proposed Action

A "Proposed Action" is defined early in the project-level planning process. This serves as a starting point for the IDT, and gives the public and other agencies specific information on which to focus comments. When the original Draft EIS was published in 2000, three alternatives were considered in detail, and Alternative C was identified as the Proposed Action as well as the Preferred Alternative. Alternative C could provide information on the economic viability of long helicopter-yarding distances and the application of uneven-aged management prescriptions. Although the net stumpage value for Alternative C was marginally negative, it was thought to be at least potentially implementable based on preliminary economic analysis.

The Forest Service proposes to selectively harvest approximately 24,359 hundred cubic feet (CCF) of timber from approximately 620 acres of National Forest Land through a single timber sale. The silvicultural treatment for the harvest units would be single-tree selection (561 acres) and group selection (59 acres). Logs would be transported to barges in Emerald Bay using

helicopter yarding. This would require no new road construction and no log transfer (LTF) facility construction.

Several things occurred in the intervening 4 years that have changed the intent, but not the need for this timber sale project. In April of 1999, Undersecretary of Agriculture James R. Lyons issued a new Record of Decision to the 1997 Tongass NF Land and Resource Management Plan that removed of most of the Cleveland Peninsula from Timber Production land use designations.

The market price for Tongass timber has declined substantially since 1999, when the first economic analysis was completed. More recent analysis shows Alternative C to be economically infeasible. To assure the consideration of all reasonable alternatives in light of the best economic information, an additional, partially roaded alternative (Alternative D), with a continued emphasis on uneven-aged management was developed between the DEIS and FEIS and described in a project update letter. The public comment period for the DEIS was extended to allow full comment on this new alternative.

Roadless Rule and Roadless Areas

The Roadless Area Conservation Rule of 2001 (roadless rule) rule generally prohibited timber harvest and road construction in inventoried roadless areas and has been the subject of numerous lawsuits. The US District Court for the District of Wyoming permanently enjoined the Forest Service from implementing the roadless rule in July 2003. The Chief of the Forest Service reinstituted interim direction in July 2004 that specifies roadless areas are to be managed to preserve their roadless characteristics until a forest-scale roads analysis is completed and incorporated into the Forest Plan, and a revised Forest Plan that considers the protection and management of roadless areas has been completed. The Tongass NF has completed a forest-scale roads analysis and a revised Forest Plan. The reservations in the interim directives no longer apply (Bschor 2003), and the Tongass NF Supervisor has the authority to sign the Record of Decision for the Emerald Bay project. Further details of the history and litigation surrounding the roadless rule are available in the Emerald Bay project record.

This changing direction has unavoidably delayed the Emerald Bay project. This Draft SEIS provides a new opportunity to review and comment on the Emerald Bay project in light of the changing circumstances.

Decision to be Made

Based on the environmental study and analysis in this Draft SEIS, and on public comment, the Tongass Forest Supervisor will decide whether and how to make timber available from the Emerald Bay project area in accordance with Forest Plan goals, objectives and desired conditions.

This decision will include:

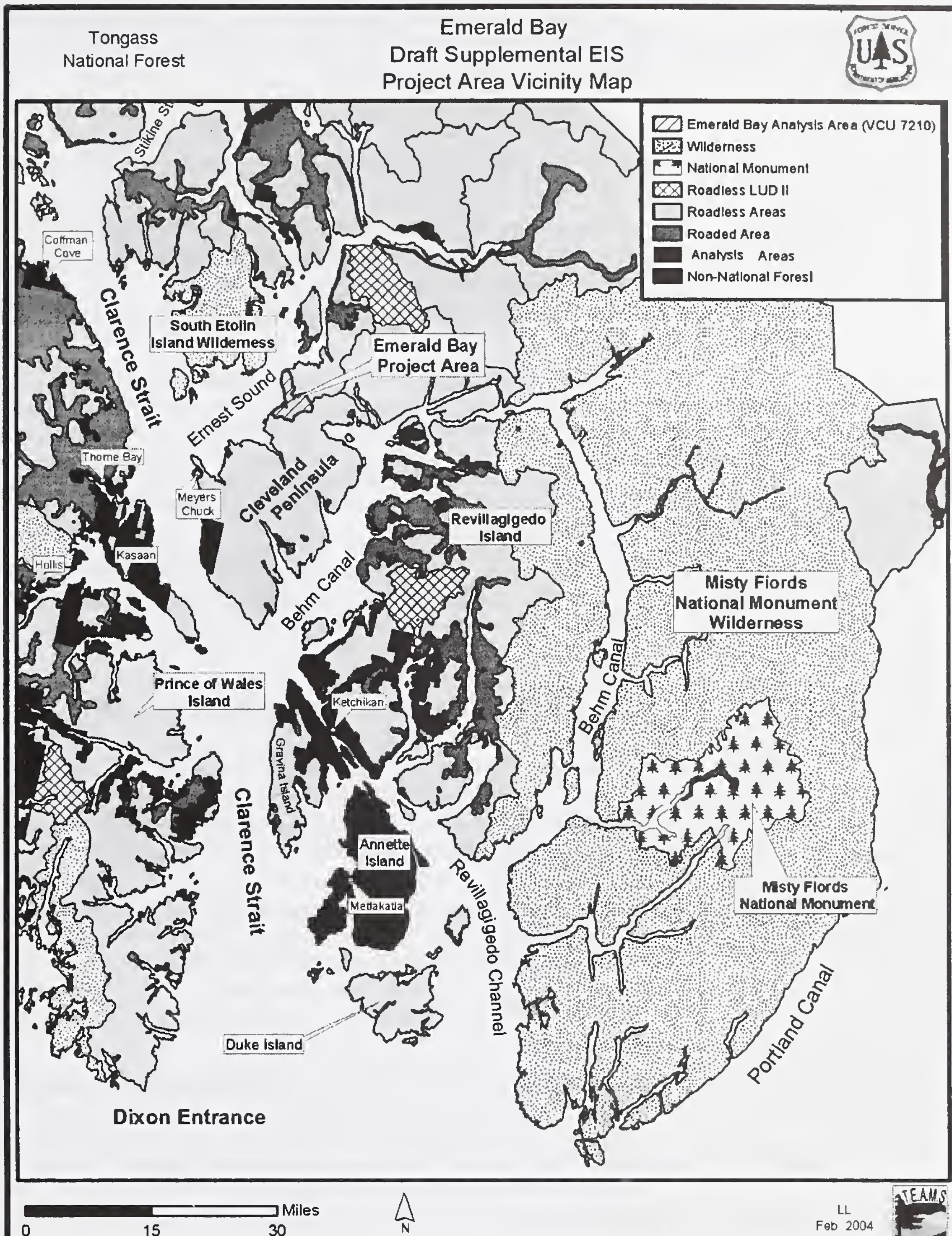
- the location, design and schedule of timber harvest, silvicultural prescriptions, road construction, and associated facilities;
- access management measures (road restrictions and closures);
- mitigation measures and monitoring requirements; and
- whether or not there may be a significant possibility of a significant restriction on subsistence use.

Project Area

The 7,845-acre Emerald Bay project area is located approximately 40 air miles north of Ketchikan, Alaska (Figure 1-1). It is located on the Cleveland Peninsula in the Emerald Creek and Birch Creek watersheds. Access to the area is by small plane originating in Ketchikan or Wrangell or by boat through Ernest Sound.

The project area includes value comparison unit (VCU) 7210. Value comparison units are defined in the Introduction to Chapter 3. For analysis purposes, the project area boundaries are considered to be the same as the VCU boundaries. The VCU boundaries generally follow major watershed divides; however, the southern tip of the project area crosses slightly into the Wasta Creek drainage, which drains into Spacious Bay. VCU 7210 is delineated in Figure 1-2.

Figure 1-1
Project Area Vicinity Map



Source: GIS, Liz LaPorta, 2004

Purpose and Need

The Emerald Bay project is proposed at this time to respond to goals and objectives of the Forest Plan, and to help move the project area toward desired conditions described in that plan. This project is intended to implement Forest Plan direction for the Timber Production land use designation as follows:

- Manage the timber resource for production of saw timber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, long-term sustained yield basis and in an economically efficient manner.
- Seek to provide a timber supply sufficient to meet the annual market demand for Tongass NF timber, and the market demand for the planning cycle.
- Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska.
- Support a wide range of natural resource employment opportunities within Southeast Alaska's communities.
- Attempt to minimize disturbance in adjoining Old-growth Land Use Designations (LUDs) and minimize fragmentation of roadless areas while still meeting the goals, objectives and desired condition for the Timber Production LUD.
- Provide local employment opportunities in the wood products industry, consistent with providing for the multiple use and sustained yield of all renewable forest resources.

Appendix A of this Draft SEIS provides additional rationale for why the Emerald Bay project was selected for analysis at this time. Further clarification can be found in the next section regarding this project's relationship to the Forest Plan.

Relationship to the Forest Plan

The analysis for this project tiers directly to the Forest Plan. The Forest Plan embodies the provisions of the National Forest Management Act, its implementing regulations, and other guiding documents and sets forth in detail the direction for managing the land and resources of the Tongass NF. The Forest Plan is a result of extensive analysis, which is described in the Forest Plan FEIS.

The Emerald Bay Draft SEIS is a project-level analysis; its scope is confined to issues about the effects of the project. It does not attempt to address decisions made at higher levels. It does, however, implement direction provided at those higher levels. When appropriate, the Emerald Bay Draft SEIS tiers to the Forest Plan FEIS, as encouraged by 40 CFR 1502.20. Also, this Draft SEIS will summarize and cite documented analyses, rather than repeat the entire analysis.

Relationship to the Final SEIS for Wilderness Recommendations

In *Sierra Club v. Lyons (J00-0009CV(JKS),* the U.S. District Court, District of Alaska directed the Forest Service to prepare a supplemental environmental impact statement (SEIS) that evaluates and considers roadless areas within the Tongass for recommendation as potential wilderness areas. The Notice of Availability for the Final SEIS and Record of Decision appeared in the Federal Register on March 7, 2003.

The roadless inventory prepared for the 1997 Forest Plan was updated to support the SEIS (Final SEIS Alternative 1 Maps). The Emerald Bay project proposes timber harvest and road construction in the Cleveland Roadless Area 528.

Land Use Designations

The Forest Plan includes area-specific goals, objectives, and desired conditions. The Forest Plan uses land use designations (LUDs) to guide management of National Forest System lands within the Tongass NF. Each designation provides for a unique combination of activities, practices and uses. The Emerald Bay project area includes two LUDs: Timber Production and Old-growth Habitat. The goals of each are described below and their locations are shown in Figure 1-2. The Forest Plan (Chapter 3) contains a detailed description of each LUD. Table 1-1 gives the acreages of each LUD within the project area.

Table 1-1
Project Area Land Allocation Acreages (National Forest System Acres)

Timber Production	Old-growth Habitat	Project Area Total
2,577	5,268	7,845

Source: Forest Service GIS Volstrata and LUD layers

Timber Production

The desired condition for the Timber Production LUD includes healthy stands in a balanced mix of age classes from young to harvestable. The goals of this designation are to: 1) maintain and promote industrial wood production from suitable timber lands, providing a continuous supply of wood to meet society's needs; 2) manage these lands for sustained long-term timber yields; and 3) seek to provide a supply of timber from the Tongass NF which meets the annual and planning-cycle market demand, consistent with the standards and guidelines of this LUD (USDA Forest Service 1997, p. 3-144)

Applicable objectives include:

- Improve timber growth and productivity on commercial forest lands.
- Plan, inventory, prepare, offer, sell, and administer timber sales and permits to ensure the orderly development of timber production.
- Seek to reduce clearcutting when other methods will meet land management objectives (USDA Forest Service 1997, p. 3-144).

Old-growth Habitat

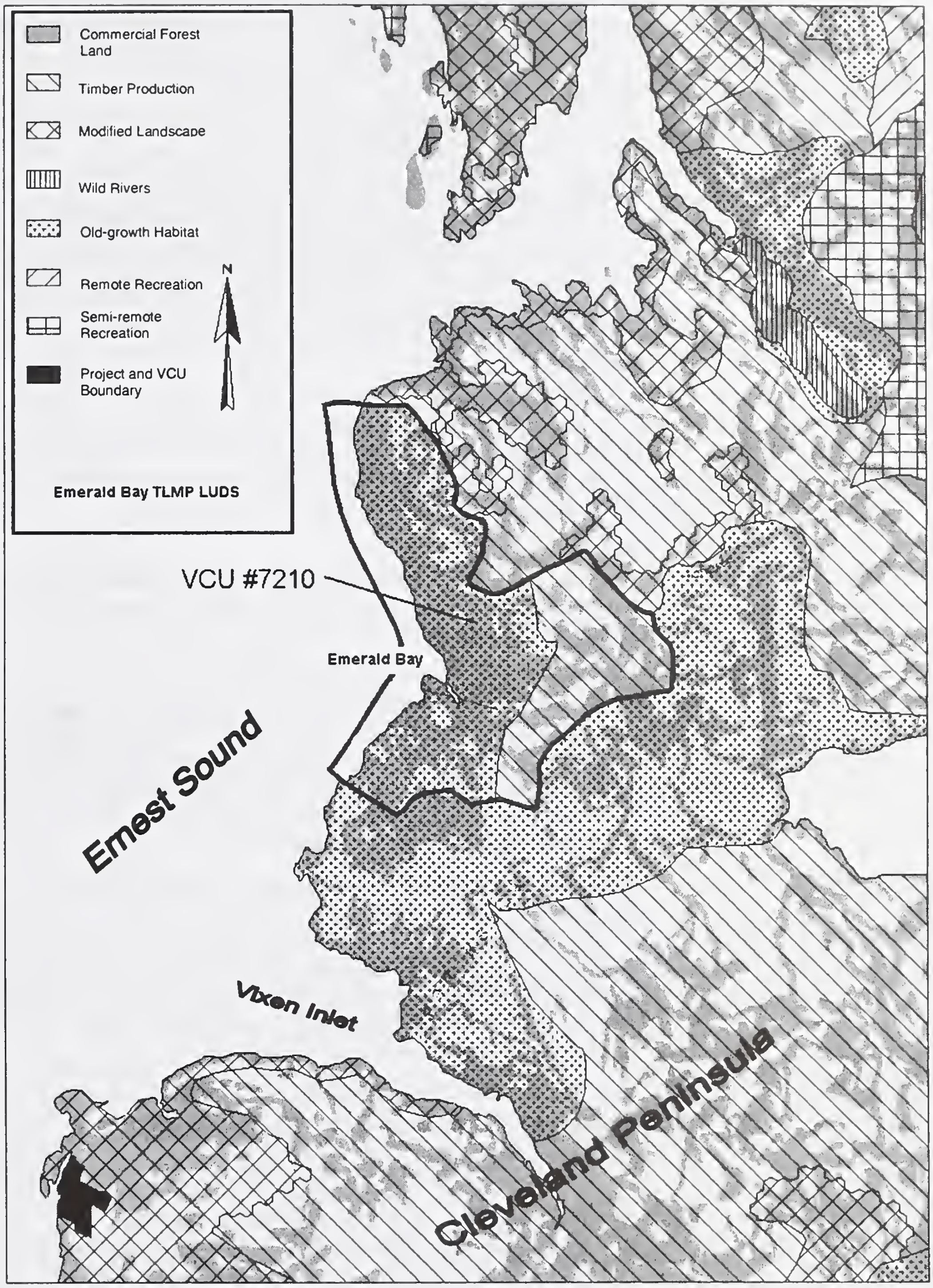
Within areas allocated to the Old-growth Habitat LUD, the desired condition is that all forested areas attain old-growth forest characteristics and provide a diversity of Old-growth Habitat types. The primary goals of the Old-growth Habitat LUD are to: 1) maintain areas of old-growth forests and their associated natural ecological processes to provide habitat for old-growth associated resources, and 2) manage early seral conifer stands to achieve old-growth forest characteristic structure and composition based on site capability (USDA Forest Service, p. 3-76).

Applicable objectives include:

- Provide old-growth forest habitats, in combination with other LUDs, to maintain viable populations of... fish and wildlife species... that may be closely associated with old-growth forests.
- Contribute to the habitat capability of fish and wildlife resources to support sustainable human subsistence and recreational uses.
- To the extent feasible, limit roads, facilities, and permitted uses to those compatible with old-growth forest habitat management objectives (USDA Forest Service 1997, p. 3-76).

The Emerald Bay project is designed to respond to these goals and objectives, and to move the project area towards the desired future conditions of the land use designations. The project proposes timber harvesting on selected timberlands suitable for the production of sawtimber and other wood products, to help meet market demands for timber and provide resource production opportunities and employment for local communities. Harvest would be expected to improve timber growth and contribute towards a balance of age classes. The area allocated to medium Old-growth Habitat Reserve comprises 67 percent of the project area. It is part of the Forest-wide system of Old-growth Habitat Reserves.

Figure 1-2
Emerald Bay Project Area, Land Use Designations and Value Comparison Units



Source: GIS, Pete Klein, 2001

Public Involvement

Scoping

The Council on Environmental Quality (CEQ) defines scoping as "...an early and open process for determining the scope of issues to be addressed and for identifying the key issues related to a Proposed Action" (40 CFR 1501.7). The scoping process was used to invite public participation and collect initial comments. It consisted of:

Notice of Intent (NOI)

A Notice of Intent was published in the *Federal Register* on August 17,.1998, when it was decided that an EIS was to be completed for the project.

Public Mailing

In early August 1998, a letter providing information and seeking public comment (scoping document) was mailed to 140 individuals and groups that had previously shown interest in Forest Service projects in Southeast Alaska. The mailing included seven Federal agencies, five State agencies and divisions, 22 Native and municipal offices, and 106 businesses and other organizations, groups, and individual citizens. The Forest received 28 responses to this initial mailing.

Local News Media

Legal announcements about the project were printed in the August 15-16, 1998 weekend edition of the *Ketchikan Daily News* and the *Wrangell Sentinel* issue of August 13. A display advertisement with map, describing the project, was placed in the August 15-16, 1998, weekend edition of the *Ketchikan Daily News*.

Public Meetings

A public meeting was held at the Narrows Inn in Ketchikan on August 24, 1998 to provide information and discuss potential areas of concern and or interest that should be addressed in the Emerald Bay project.

Consultation with Tribal Governments

Government-to-government consultations with federally recognized tribal governments and meetings with traditional tribal governments took place in 1998 and included: Wrangell Cooperative Association, John Feller, Saxman IRA, and Ketchikan Indian Community. Tribal concerns were considered in the environmental analysis of effects of the alternatives. However, tribal consultation with tribal governments does not imply that they endorse the Proposed Action or any of the alternatives.

Draft EIS

Availability of Draft EIS for Public Comment

Availability of the Draft EIS was announced on January 28, 2000, both in the *Federal Register* and through notices in local newspapers. These notices serve as the official start of a public comment period. Documents were also mailed to Federal and State agencies, Native and municipal offices, and others who requested them. Due to uncertainty as to when publication in the Federal Register would occur, the comment period was extended well beyond the minimum 45 days to April 15, 2000.

Public Information Meeting

A public information meeting was held on March 2, 2000 to introduce a fourth alternative, D, which combined elements of Alternatives B and C. Alternative D was developed in response to changes in the economic feasibility of Alternative C after the Draft EIS was published.

Project Update Letter, March 20, 2000

A project update letter was sent to those on the Draft EIS mailing list on March 20, 2000 incorporating comments from the public meeting and detailing Alternative D. In order to allow adequate time for comments, this letter extended the comment period on the Draft EIS to May 5, 2000 for a total of 98 days.

Analysis and Incorporation of Public Comment

Twenty-two agencies, organizations, and individuals submitted written comments on the Emerald Bay Draft EIS. The IDT analyzed and incorporated these comments into the Final EIS. Public comments, along with the Forest Service's responses, are listed in Appendix B of the Emerald Bay Final EIS.

Comments received were roughly divided into three categories. Many respondents were apprehensive over the proposal to build road and harvest timber in the Cleveland Peninsula. They felt the roadless nature of the Cleveland Peninsula should be retained. They referenced a letter from the Governor of Alaska corroborating that statement. Others were concerned that a precedent would be set by proposing to build a road through a medium Old-growth Reserve. They cited possible impacts to fish and wildlife resources and wondered what allowances would be made. Others expressed concern over the economic viability of proposing uneven-aged management prescriptions in an isolated patch of land designated as Timber Production. They also questioned whether these prescriptions would meet the objectives of the Timber Production LUD and/or the Purpose and Need for the project.

The IDT evaluated and responded to these comments (Appendix B-Final EIS) and incorporated as many of them as possible into the Final EIS. Alternative D resulted from the comments.

Final EIS and Record of Decision

Final EIS and Record of Decision

Forest Supervisor Thomas Puchlerz signed the Emerald Bay Timber Sale Record of Decision on September 13, 2001. The Notice of Availability of the Final Environmental Impact Statement was published in the Federal Register on November 2, 2001 and the Legal Notice was published in the *Juneau Empire* on November 2, 2001. The decision was subject to administrative appeal.

Appeal of the Record of Decision

The Tongass Forest Supervisor's decision was reversed on appeal to the Regional Forester because the Final FEIS did not adequately consider the potential effects of the project on roadless area values.

Project Update

Public Scoping – Project Update Letter, October 2002

A project update letter was sent to those on the EIS mailing list in October 2002 announcing the preparation of the SEIS. The letter requested comments on the preparation of the SEIS. Fourteen agencies, organizations, and individuals submitted written comments on the project.

Issues

Issues Associated with the Proposed Action

Issues for the Emerald Bay project were identified through public and internal scoping. Similar issues were combined into one statement where appropriate. The following two issues were determined to be key and within the scope of the project decision. These issues are addressed through the Proposed Action and alternatives.

Timber Economics and Supply

This issue encompasses public concern regarding:

- the amount of timber available and proposed for harvest,
- the methods of timber harvest,
- balancing timber production with other forest resources,
- how the project contributes to the long-term timber supply,
- cost-effective timber harvest.

Roadless and Road Construction

This issue encompasses construction of roads into areas available for timber management but currently unroaded, and management of those roads following timber harvest. The impacts of the Proposed Action and action alternatives on the Cleveland Peninsula roadless area's values and wilderness characteristics are main concerns in this issue. Road building through a medium Old-growth Reserve is also a concern. As the project analysis progressed, many people expressed the desire to see the Cleveland Peninsula remain unroaded while others objected to both roading and timber harvest.

Issues Outside the Scope of this Project

The following public concerns were considered but determined not to be key issues. Some are already addressed through other processes or in the Forest Plan, or their resolution is beyond the scope of this project.

Forest Plan Management Land Use Designations (LUDs)

Some commenters recommend changing the Forest Plan management prescriptions in order to eliminate, reduce, or increase the level of harvest (ASQ) and/or maximize specific resources. Included within this concern are suggestions that Forest Plan Standards and Guidelines or Best Management Practices not be implemented. Comments regarding the general management of the Tongass NF, management prescriptions, or procedural issues are beyond the scope of this project.

Regional Timber Supply and Demand Should be Refigured

Analysis of timber supply and demand is a Regional concern which exceeds the scope of this analysis. This issue was addressed as part of the Forest Plan process. A site-specific environmental analysis documents the effects of the proposed activities. Predicting the effects of the proposed activities upon the Regional timber supply and demand is beyond the capability and scope of this document, other than concluding that timber offerings resulting from the project would contribute volume to the Regional timber supply and help meet demand. The volume of timber cleared in a NEPA document may be offered in whole, in part, or not at all, depending upon rapidly changing market conditions or other factors important in the overall management of the national forests. The issue of how the project contributes to the long-term timber supply is addressed as part of Issue 1: Timber Economics and Supply and in Appendix A.

Cleveland Peninsula Road (Off Island) Transportation Link

The Cleveland Peninsula road connection is not a connected or reasonably foreseeable action that is ripe for a decision. The proposed transportation link is located approximately 6 air-miles from the project area. About 12 miles of road would be needed to service the proposed link.

Do Not Use a Predetermined Harvest Volume

Harvest volume was part of the Proposed Action and is based on the area to be harvested and the silvicultural prescriptions. The alternatives to the Proposed Action propose different harvest volumes.

Other Concerns

Soils, Hydrology, and Fisheries

Mitigation measures, including stream buffers, would be used to reduce impacts to water quality and fisheries habitat (Forest Plan, Chapter 4 and Appendix C). These mitigation measures would include the Tongass Timber Reform Act (TTRA) buffers, Forest Plan Riparian Management areas, beach fringe, construction timing restrictions, and limiting harvest on unstable soils.

Recreation and Scenic Quality

Some comments address the importance of protecting the scenic quality from Ernest Sound. This concern is adequately addressed in the Forest Plan Standard and Guidelines and the Tongass Plan Implementation Team (TPIT) clarifications. Forest management activities would have no impacts to existing recreational pursuits by users of the Emerald Bay project area.

However, increased human access, timber harvest, and other developments could affect recreation values and opportunities such as hunting, fishing, and scenic quality.

Heritage Resources

Harvest and road building activities can affect historical properties. A heritage resource survey was conducted and all sites would be avoided in accordance to law. The State Historic Preservation Officer has been consulted, in accordance with Section 106 of the NHPA and 36 CFR Part 800, and concurred that no National Register eligible sites would be affected by the proposed activities. No effects on known significant cultural resources are anticipated.

Federal and State Permits, Licenses, and Certifications

Prior to implementation of the proposed timber sale, various permits must be obtained from Federal and State agencies. Administrative actions on these permits would be initiated after the EIS is filed with the Environmental Protection Agency (EPA). The agencies and their responsibilities are listed below.

U.S. Army Corps of Engineers

- Approval of discharge of dredged or fill material into waters of the United States (Section 404 of the Clean Water Act of 1977, as amended)
- Approval of construction of structures or work in navigable waters of the United States (Section 10 of the Rivers and Harbors Act of 1899)

U.S. Coast Guard

- Coast Guard Bridge Permit (in accordance with the General Bridge Act of 1946) required for all structures constructed across navigable waters of the U.S.

U.S. Environmental Protection Agency

- Storm water discharge permit
- National Pollutant Discharge Elimination System review (Section 402 of the Clean Water Act)

U.S. Fish and Wildlife Service

- Variance for bald eagle nest

State of Alaska, Department of Environmental Conservation

- Certification of compliance with Alaska Water Quality Standards (Section 401 Certification)
- Solid Waste Disposal Permit (Section 402 of the Clean Water Act)

State of Alaska, Department of Natural Resources

- Authorization for occupancy and use of tidelands and submerged lands

Applicable Laws and Executive Orders

A partial list of Federal laws and Executive Orders pertaining to project-specific planning and environmental analysis on Federal lands are shown below. While most pertain to all Federal lands, some of the laws are specific to Alaska. Disclosures and findings required by these laws and orders are contained in Chapter 2.

- Alaska Native Claims Settlement Act (ANCSA) of 1971
- Alaska National Interest Lands Conservation Act (ANILCA) of 1980

- American Indian Religious Freedom Act of 1978
- Archeological Resource Protection Act of 1980
- Cave Resource Protection Act of 1988
- Clean Air Act of 1970 (as amended)
- Clean Water Act of 1972 (as amended)
- Coastal Zone Management Act (CZMA) of 1972 (as amended)
- Coastal Zone Management Act MOU of 1999
- Endangered Species Act (ESA) of 1973 (as amended)
- Executive Order 11593 (cultural resources)
- Executive Order 11988 (floodplains)
- Executive Order 11990 (wetlands)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (aquatic systems and recreational fisheries)
- Executive Order 13007 (Indian sacred sites)
- Executive Order 13174 (government-to-government consultation)
- Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)
- Magnuson-Stevens Fishery Conservation and Management Act of 1996
- Marine Mammal Protection Act of 1972
- Multiple-Use Sustained-Yield Act of 1960
- Migratory Bird Treaty Act of 1918 (amended 1936 and 1972)
- Native American Graves Protection and Repatriation Act (NAGPRA) of 1990
- National Environmental Policy Act (NEPA) of 1969 (as amended)
- National Forest Management Act (NFMA) of 1976 (as amended)
- National Historic Preservation Act of 1966 (as amended)
- Organic Act of 1897
- Rivers and Harbors Act of 1899
- Tongass Timber Reform Act (TTRA) of 1990
- Wild and Scenic Rivers Act of 1968, amended 1986

State of Alaska

Under the Coastal Zone Management Act (CZMA) of 1972, as amended, Forest Service activities and development projects that affect the coastal zone must be consistent to the maximum extent practicable with the enforceable policies of the Alaska Coastal Management Program (ACMP). Such "consistency determinations" are made by the Forest Service, and are reviewed by the State of Alaska as required by the CZMA. Under the Alaska Forest Resources and Practices Act (AFRPA) of 1979, as amended, Forest Service timber harvest projects satisfy the CZMA consistency requirement if the Forest Plan and all related standards and guidelines applicable to the project provide no less resource protection than the AFRPA requires for timber harvest projects on State land, except that the AFRPA specifies a different minimum riparian standard for Federal projects than for State projects. Findings regarding consistency are included in Chapter 2.

Availability of the Planning Record

An important consideration in preparation of this Draft SEIS has been reduction of paperwork as specified in 40 CFR 1500.4. In general, the objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated. The planning record contains material which documents the NEPA process and analysis from the beginning of the project to the publication of the Final SEIS.

The planning record is located at the Ketchikan–Misty Fiords Ranger District office in Ketchikan, Alaska. Reference documents such as the Forest Plan, the Tongass Timber Reform Act, and the Resources Planning Act, are available at public libraries around the Region as well as at the Supervisor's Offices in Ketchikan, Petersburg and Sitka. The Forest Plan is also available on the internet (http://www.fs.fed.us/r10/tongass/) and on CD-ROM.

Chapter 2

Alternatives

Chapter 2

Alternatives

Introduction

This chapter describes and compares the alternatives considered by the Forest Service for the Emerald Bay project. It includes a discussion of how alternatives were developed, an overview of mitigation measures, monitoring and other features common to all alternatives, a description of each alternative considered in detail, and a comparison of these alternatives focusing on the key issues. Chapter 2 is intended to present the alternatives in comparative form, sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public (40 CFR 1502.14). Maps of the alternatives are included in this Chapter.

Some of the information in Chapter 2 is summarized from Chapter 3, "Affected Environment and Environmental Consequences." Chapter 3 discusses the scientific basis for establishing baselines and measuring the potential environmental consequences of each of the alternatives. For a fuller understanding of the effects of alternatives, readers will need to consult Chapter 3.

Alternative Changes Between the 2001 Final EIS and Draft SEIS

Preferred Alternative

The Forest Supervisor selected Alternative D in the 2001 Emerald Bay Record of Decision. In consideration of the current low timber market prices, the agency has now identified Alternative B as the preferred alternative.

The Preferred Alternative, Alternative B would harvest approximately 32,749 hundred cubic feet (CCF) of timber from approximately 601 acres of National Forest System land through a single timber sale. This would require new road construction and a log transfer facility (LTF).

Harvest Unit Modification

There have been slight modifications to harvest unit boundaries and unit acres based on knowledge of the planning area acquired since the 2001 ROD was published. Modifications made to unit boundaries better reflect on-the-ground conditions. Alternative maps and unit cards reflect the modified units. Associated changes were made in cutting unit acres, harvest volume, harvest method acres, and harvest system acres. The effects analysis of the alternatives (Chapter 3) has been updated to reflect the unit changes.

Alternative Design

The 2001 Record of Decision included measures to minimize the impacts of the selected alternative. These measures have now been incorporated into the design of the action alternatives:

- Roads in Alternatives B and D would be constructed to minimize impacts. Road width would be 14 feet, and the surface would be outsloped, with no ditch except in turnpike areas. Log-stringer bridges would be used to cross drainages, and culverts

would only be used for crossdrain areas.

- Roads in Alternatives B and D would be closed to public traffic during the time-span of the timber sale contract.
- Roads in Alternatives B and D would be closed to motorized vehicles when harvest operations are complete. Closure would include log-stringer bridge removal and storm proofing (water bar construction). In addition, the first section of the road, within beach sight distance, would be obliterated through the placement of debris, such as rocks, root wads, and large wood pieces, on the road surface.
- The LTF in Alternatives B and D would be decommissioned when harvest operations are complete. The bulkhead pier would be removed; the site would be recontoured, covered with overburden, and planted with trees. Debris would also be placed on the LTF site to discourage vehicle off-loading.
- Logging camps in Alternatives B, C, and D would not be allowed in the Old-growth Reserve (OGR) LUD. Logging camps would either be located off-shore, or inland, within the Timber Production LUD.

Development of Alternatives

The alternatives for this project remain the same as the ones displayed in the 2001 FEIS. Each alternative provides a different response to the key issues for the Emerald Bay project. Each alternative represents a site-specific proposal developed through intensive interdisciplinary team evaluation of timber harvest unit and road design, based on field verification. Unit identification and design also made use of topographic maps and aerial photos, and a large quantity of resource data available in geographic information system (GIS) format.

The IDT used information from the analysis of scoping comments, in conjunction with the field-verified pool of units for the project area, to formulate different alternative approaches. Preliminary analysis and management direction were used to further refine the alternatives described here for the Emerald Bay project.

Many of the resource concerns raised during scoping, interagency discussions, and subsequent analysis did not become key issues driving alternative development. Some of these concerns were addressed by eliminating potential harvest acreage from consideration, and others have been, or will be, addressed during the design and implementation of the proposed activities. For example, various resource standards and guidelines from the Forest Plan, and the applicable Best Management Practices (BMPs) used to meet requirements of the Clean Water Act, are automatically applied when potential harvest units or roads are located and designed. In addition, based on resource analysis and/or interdisciplinary work, additional mitigation measures would be applied for specific proposed activities.

Items Common to All Alternatives

Key Forest-wide Standards and Guidelines in the Project Area

The following list highlights key Forest Plan Standards and Guidelines, mitigation measures, findings, or processes applied to the projects that are common to all alternatives. Applicable Forest Plan Standards and Guidelines, BMPs, and other specific mitigation measures are identified on the harvest unit and road cards for implementation of the project. More detailed information about standards and guidelines can be found in the Forest Plan, Chapter 4.

Beach and Estuary Fringe

The beach and estuary fringe is an area of approximately 1,000 feet inland from mean high tide around all marine coastlines. Programmed timber harvest is not allowed and roads are located outside the fringe when possible.

Karst and Caves

Surveys were conducted to search for karst and caves. No karst or caves were located within the project area.

Riparian

Riparian Management Areas are areas of special concern regarding fish, other aquatic resources, and wildlife. These areas are delineated according to the process-group direction in the Riparian Forest-wide Standards and Guidelines. Forest Plan Standards and Guidelines for riparian areas generally exclude timber harvest from the riparian area along all Class I, II, and III streams. Class IV streams may be considered for timber harvest. Class IV streams occur in units receiving both clearcut and partial harvest. Specific riparian area protection measures and application of Best Management Practices (BMPs) are documented on the road and unit cards.

Other Land Status within the Project Area

This designation includes those lands within a project area which have been conveyed to the State, Native corporations or other private entities. There are no lands within the Emerald Bay project area which have been conveyed to State, Native or private ownership.

Fish and Marine Habitats

Forest Plan Standards and Guidelines for riparian areas apply to all lakes and streams within the project area.

No opportunities were identified for reducing Riparian Management Area boundaries, although some were increased where more protection was warranted.

Heritage Resources

Forest Plan Standards and Guidelines for heritage resources state that the preferred management of sites listed in, nominated to, or eligible for the National Register of Historic Places is avoidance and protection (p. 4-15). Evaluation of the data collection needs and survey strategy is described in a 1995 Agreement between the Forest Service Alaska Region, Alaska State Historic Preservation Office, and the Advisory Council on Historic Preservation (#95MOU-10-029). This agreement modifies the standard procedures described in Section 106 of the National Historic Preservation Act, 1966.

No significant historic properties were discovered during field investigations (USDA FS CRM Reports 1998-05-17).

Harvest units and all proposed road construction above 200 feet elevation fall in low-sensitivity areas for heritage resources as defined in the 1995 Agreement (#95MOU-10-029); they occur at elevations above 100 feet and do not possess other characteristics which would suggest focused historic or prehistoric activities. Field investigations were concentrated within areas of higher potential for locating significant heritage resource sites; along the coast and estuaries including the proposed LTF location. The possibility that significant historic properties exist within the Area of Potential Effects for this project is very low. The Alaska State Historic Preservation Officer concurred with the recommendation that no significant heritage resource sites would be affected by the proposed activities based upon the literature review and subsequent field investigations. Following harvest, a sample of roads and units would be monitored to test the assumptions of the sensitivity model.

Soils, Water Quality and Wetlands

Potential harvest units with slopes greater than 72 percent received an on-site analysis of slope and Class IV channel stability. The analysis included an assessment of potential downstream effects. Only areas with low levels of risk are included in the unit pool.

Subsistence
All alternatives have been evaluated in compliance with ANILCA, Title VIII, Section 810. Emerald Bay is an area of low subsistence use, and the Forest Service has determined that this project would not pose a significant possibility of significant restriction on subsistence use.

Timber Harvesting
Risks from windthrow have been evaluated, and methods to minimize windthrow are incorporated into all harvest unit prescriptions.

Wildlife Habitat
The Forest Plan conservation biology strategy, including all species-specific standards and guidelines, is considered sufficient to maintain habitat for viable populations for all species potentially within the planning area. Each alternative complies with the Forest Plan conservation biology strategy designed to ensure well-distributed viable populations of wildlife.

The Forest Plan directs that marten Standards and Guidelines will be applied to harvest occurring in high-risk biogeographical provinces. The Revillagigedo Island and vicinity is identified as a high-risk biogeographical province. The Forest Plan FEIS (pages 3-12) identifies the Cleveland Peninsula as being part of the Revilligigedo Biogeographical Province; therefore Marten Standards and Guidelines apply to the Emerald Bay project. All harvest units containing high-value marten habitat are designed to retain at least 10-20 percent canopy closure consistent with the Marten Standards and Guidelines.

The small Old-growth Habitat Reserves (Old-growth Habitat Land Use Designation) mapped in the Forest Plan are required to be evaluated for size, spacing, and habitat composition. Two small Old-growth Habitat Reserves in the Emerald Bay vicinity have been evaluated with interagency involvement. A small OGR is not required in VCU 7210 because 67 percent of VCU 7210 is in a medium Old-growth Habitat Reserve Land Use Designation.

Logging Systems

Yarding is the process of transporting logs from the stump to the landing. This can be done using ground-based equipment, cable logging systems, or helicopters. The method prescribed depends upon many factors, including access, topography, slope, and resource protection needs.

All proposed logging systems conform to national and regional standards and guidelines. Logging systems were assigned to the harvest units through interdisciplinary analysis to minimize the potential effects. On-site ground reconnaissance and field evaluations during the planning and layout process would ensure the yarding system assigned provides the required suspension to meet management objectives. Tables 2-1 through 2-5 display the logging systems planned for each alternative.

Shovel Yarding
Moist, soft soil conditions in conjunction with steep slopes found in the project area limit the use of ground-based equipment. Approximately 1-2 percent of the proposed harvest acres could be shovel yarded with track-mounted log loaders, depending on the alternative. Road rights-of-way are particularly suitable for shovel yarding. Shovel yarding is generally the most economical yarding method, although its use is limited in Southeast Alaska due to prohibitive field conditions, including its potential for ground disturbance.

Cable Yarding
Cable yarding systems are the most common logging systems used throughout Southeast Alaska. Cable systems have the capability to partially or fully suspend logs over the ground, reducing soil disturbance.

Helicopter Yarding
With this system logs are lifted off the ground (fully suspended) and flown to a landing or barge. This yarding system causes the least amount of ground disturbance of all the systems,

and usually has the highest yarding cost, as much as three times higher than cable logging systems. Consequently, the economic feasibility of helicopter logging is more closely affected by timber market values than the other types.

Alternatives Considered in Detail

The Council on Environmental Quality (CEQ) regulations (40 CFR 1502.10(e)) state that EISs shall consider "alternatives including the Proposed Action." Alternative C reflects the agency's original 1998 Proposed Action. Three alternatives to the Proposed Action are also considered in detail. Alternative A is the No-action Alternative, under which the project would not be implemented. Alternatives B and D represent different means of satisfying the Purpose and Need, by responding with different emphases to the key issues discussed in Chapter 1. Alternative D combines elements of both B and C.

Alternative A (No Action)

The emphasis of Alternative A, No Action, is to propose no new timber harvest or road construction from the Emerald Bay project area at this time. It does not preclude timber harvest from other areas at this time, or from the Emerald Bay project area at some time in the future. The Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14(d)) require that a "No Action" alternative be analyzed in every EIS. This alternative represents the existing condition.

Table 2-1
Alternative A - No Action

Category	Unit of Measure	Amount
Harvest Method		
Clearcut	acre	0
Single-tree Selection	acre	0
Group Selection	acre	0
Harvest Volume	CCF[1]	0
	MBF[2]	0
Harvest System		
Long Span Cable	acre	0
Short Span Cable	acre	0
Helicopter	acre	0
Shovel	acre	0
Roads		
New construction	mile	0
LTF construction	#	0
Economics		
Average harvest cost	$/CCF	$0
Net Stumpage Value[3]	$/CCF	$0
Employment	jobs/year	0

[1]CCF = hundred cubic feet
[2] MBF = thousand board feet
[3]at current market prices, NEAT 2nd Quarter 2003
Source: M.North

Alternative B (preferred alternative)

The emphasis of Alternative B is to progress toward the desired condition for timber management while meeting Forest Plan Standards and Guidelines for other resources. Timber volume made available is maximized in this entry under this alternative. This alternative would utilize even-aged harvest systems with 100-year rotations and uneven-aged systems where helicopter yarding is necessary. Logging costs have been reduced by the use of roads and conventional cable yarding systems.

Alternative B proposes to harvest 601 acres of commercial forest land in eight harvest units producing 32,749 hundred cubic feet (CCF) (16,373 MBF) of timber. The average size of harvest units is 75 acres.

Average harvest costs would be $179.11 per CCF.

New road construction totals 6.2 miles, 2.2 miles of which bisect the medium Old-growth Habitat Reserve. Roads would be constructed to minimize impacts. Road width would be 14 feet, and the surface would be outsloped, with no ditch except in turnpike areas. Log-stringer bridges would be used to cross drainages, and culverts would only be used for crossdrain areas. Road construction would include 3 rock pits of approximately 1/5 acre each. Two of these rock pits would be in the medium Old-growth Habitat Reserve.

This alternative would construct a land-to-barge LTF site which would only be useable at high tide.

Roads would be closed to public traffic during the time-span of the timber sale contract.

All roads would be closed to motorized vehicles when harvest operations are complete. Closure would include log-stringer bridge removal and storm proofing (water bar construction). In addition, the first section of the road, within beach sight distance, would be obliterated through the placement of debris, such as rocks, root wads, and large wood pieces, on the road surface.

The LTF would be decommissioned when harvest operations are complete. The bulkhead pier would be removed and the rock fill would be spread on the site to re-establish the original contours. The rock would be covered with overburden and planted with trees. Debris barriers would be placed on the site to discourage vehicle off-loading.

Logging camps would not be allowed in the Old-growth Reserve (OGR). Logging camps would either be located off-shore, or inland, within the Timber Production LUD.

Table 2-2
Alternative B - Harvest Objectives and Practices

Category	Unit of Measure	Amount
Harvest Method		
Clearcut	acre	396
Single-tree Selection	acre	205
Group Selection	acre	0
Harvest Volume	CCF[1]	32,749
	MBF[2]	16,373
Harvest System		
Long Span Cable	acre	75
Short Span Cable	acre	299
Helicopter	acre	218
Shovel	acre	9
Roads		
New construction	mile	6.2
LTF construction	#	1
Economics		
Average harvest cost	$/CCF	$179
Net Stumpage Value[3]	$/CCF	$48
Employment	jobs/year	86

[1]CCF = hundred cubic feet
[2]MBF = thousand board feet
[3]at current market prices, NEAT 2nd Quarter 2003
Source: M. North

Alternative C

The objective of this alternative is to emphasize uneven-aged management by using selection harvest methods to maintain at least three distinct age-classes. To lessen impact, subsequent entries would be widely spaced over intervals of 50-100 years. This approach does not require road construction, provides timber volume, allows information to be gathered on long-distance helicopter harvesting, and maintains the integrity of large, unfragmented blocks of old-growth forest. This alternative responds to the issue of the effects on the roadless area by no road construction and maintaining a natural appearing landscape.

Alternative C proposes to harvest 620 acres of commercial forest land in ten harvest units producing 24,359 CCF (12,179 MBF) of timber. The average unit size is 62 acres.

Average harvest costs would be $403.08 per CCF. As discussed in the 2001 ROD, this alternative is economically infeasible under foreseeable timber markets.

Logging camps would not be allowed in the OGR. Logging camps would either be located off-shore, or inland, within the Timber Production LUD. No log transfer facilities are proposed for Alternative C. The logs from the units would be placed directly on barges.

Table 2-3
Alternative C - Harvest Objectives and Practices

Category	Unit of Measure	Amount
Harvest Method		
Clearcut	acre	0
Single-tree Selection	acre	561
Group Selection	acre	59
Harvest Volume	CCF[1]	24,359
	MBF[2]	12,179
Harvest System		
Long Span Cable	acre	0
Short Span Cable	acre	0
Helicopter	acre	620
Shovel	acre	0
Roads		
New construction	mile	0
LTF construction	#	0
Economics		
Average harvest cost	$/CCF	$403
Net Stumpage Value[3]	$/CCF	- $189
Employment	jobs/year	64

[1] CCF = hundred cubic feet
[2] MBF = thousand board feet
[3]at current market prices, NEAT 2nd Quarter 2003
Source: M. North

Alternative D

The objective of Alternative D is to balance the timber economics with resource and social concerns related to the roadless area. It would emphasize uneven-aged management by using selection harvest methods and, like Alternative C, would schedule subsequent entries over intervals of 50-100 years. In order to implement these prescriptions, helicopter yarding would be needed even though some of the units are adjacent to roads and are planned for cable yarding in Alternative B.

In order to improve the financial efficiency, this alternative proposes to build 3.8 miles of low-impact road (2.2 miles are within the medium Old-growth Habitat Reserve). This road shortens the helicopter yarding distance, which decreases the logging cost and conversely increases net stumpage value.

This approach seeks to provide more economical timber volume, while minimizing road construction and reducing effects on the roadless character of the Cleveland Peninsula. Although the current net stumpage value is negative, this alternative was appraised positive in 2001 and may increase in value due to fluctuations in the timber market.

Alternative D proposes to harvest 620 acres of commercial forest land in ten harvest units, producing 24,783 CCF (12,391 MBF) of timber. The average unit size is 62 acres. Current average harvest costs would be $232 per CCF.

Road width would be 14 feet and the surface would be outsloped, with no ditch except in turnpike areas. Log-stringer bridges would be used to cross drainages, and culverts would only

be used for crossdrain areas. Road construction would include 3 rock pits of approximately 1/5 acre each. Two of these rock pits would be in the medium Old-growth Habitat Reserve.

This alternative would construct a land-to-barge LTF site which would only be usable at high tide.

Roads would be closed to public traffic during the time-span of the timber sale contract.

All roads would be closed to motorized vehicles after harvest operations are completed. Closure would include bridge removal and storm proofing (water bar construction). In addition, the first section of road, within beach sight-distance, would be obliterated through the placement of debris such as rocks, root wads, and large wood pieces on the road surface.

The LTF would be decommissioned when harvest operations are complete. The bulkhead pier would be removed and the rock fill would be spread on the site to re-establish the original contours. The rock would be covered with overburden and planted with trees. Debris barriers would be placed on the site to discourage vehicle off-loading.

Logging camps would not be allowed in the Old-growth Reserve. Logging camps would either be located off-shore, or inland, within the Timber Production LUD.

Table 2-4
Alternative D - Harvest Objectives and Practices

Category	Unit of Measure	Amount
Harvest Method		
Clearcut	acre	0
Single-tree Selection	acre	561
Group Selection	acre	59
Harvest Volume	CCF[1]	24,783
	MBF[2]	12,391
Harvest System		
Long Span Cable	acre	0
Short Span Cable	acre	0
Helicopter	acre	609
Shovel	acre	11
Roads		
New Construction	mile	3.8
LTF Construction	#	1
Economics		
Average Harvest Cost	$/CCF	$232
Net Stumpage Value[2]	$/CCF	$-29.40
Employment	jobs/year	65

[1]CCF = hundred cubic feet
[2]MBF = thousand board feet
[3]at current market prices, NEAT 2nd Quarter 2003
Source: M. North

Comparison of Alternatives

This section compares outputs, objectives and effects of the alternatives in terms of the key issues for the Emerald Bay project. The discussions of effects are summarized from Chapter 3 which provides a full description and analysis of effects. Table 2-5 provides an overview comparison of information from the alternative descriptions. This information is used in the discussions which follow.

Table 2-5
Comparison of Action Alternatives - Outputs, Objectives and Effects

Category	Unit of Measure	Alt A	Alt B	Alt C	Alt D
Harvest Method					
Clearcut	acre	0	396	0	0
Single-tree Selection	acre	0	205	561	561
Group Selection	acre	0	0	59	59
Harvest Volume[1]	CCF[2]	0	32,749	24,359	24,783
	MBF[3]	0	16,373	12,179	12,391
Harvest Units					
Number of Units	#	0	8	10	10
Average Unit Size	acre	0	75	62	62
Harvest System					
Long Span Cable	acre	0	75	0	0
Short Span Cable	acre	0	299	0	0
Helicopter	acre	0	218	620	609
Shovel	acre	0	9	0	11
Roads					
New Construction	mile	0	6.2	0	3.8
LTF Construction	#	0	1	0	1
Economics					
Average Harvest Cost	$/CCF	0	179	$403	$232
Net Stumpage Value[3]	$/CCF	0	$48	- $189	-$29
Employment	jobs/year	0	86	64	65

[1]Harvest volume for Alternatives B and D includes road right-of-way clearing
[2]CCF = hundred cubic feet
[3]MBF = thousand board feet
[4]at current market prices, NEAT 2nd Quarter 2003
Source: M. North

Issue 1: Timber Sale Economics

Alternative A proposes no timber harvest, and thus offers no opportunity for timber-related employment or personal income. Alternative B offers the most timber volume and generates the highest potential number of jobs and has the lowest average overall harvest cost per CCF. Alternative C offers the least timber volume and it also has the highest average overall harvest cost per CCF. Alternative D falls between Alternatives B and C in regard to harvest cost and timber volume. However, Alternative D may be uneconomical to operate under current market conditions. Alternative C is currently uneconomical in any foreseeable market condition.

Issue 2: Roadless and Road Construction

Alternative B would affect the roadless characteristics of 1,324 acres within the Cleveland Roadless Area due to road construction and implementation of the clearcut silvicultural treatment. This alternative would have the greatest impact on roadless characteristics of all the action alternatives. Road construction in Alternative D would detract from the roadless area characteristics and would affect the roadless characteristics of 614 acres, however partial harvest treatment areas would retain their roadless characteristics. Under Alternatives A and C, all acres would retain their roadless characteristics.

Alternatives Considered But Not Analyzed in Detail

- An alternative that accesses the project from the Wrangell Ranger District was discussed but dropped from further study. Steep, rugged slopes preclude a reasonable road connection from the north (VCU-7210 Area-Scale Roads Analysis Determination 2001).
- Another alternative that proposed traditional cable harvest and clearcut prescriptions on the portions of Units 1 and 12 accessible by road was also considered. This alternative represents a minor recombination of aspects of Alternatives B and D, and is within the range of alternatives already considered in detail. Timber economics and environmental impacts fall within the range described in the Draft SEIS for Alternatives B and D, and are, overall, close to those shown for Alternative D. On the other hand, as it would involve clearcutting, this alternative raises some of the same public issues as Alternative B. Because it is substantially duplicated by other alternatives and falls within the range already considered and available for selection, there was no need to fully develop this alternative for detailed independent consideration.
- An alternative that proposed harvesting less than 8 MMBF was investigated in direct response to a public comment. This would require using even-aged prescriptions, cable yarding, and road construction in order to make an economically viable offering with the effects being similar to Alternative B. While this would result in smaller volume harvested, the road construction and clearcuts would make this alternative less responsive than Alternative C to the commenter's overall concerns.
- Various combinations of alternatives were also considered, including combining even-aged prescriptions in Alternative C. Adding clearcuts to Alternative C would not improve the economics since it would require moving large volumes of low-value wood over long distances by helicopter.
- Measures to improve the economics of helicopter yarding were considered: units with the longest yarding distance were deferred to decrease yarding distance, timber utilization standards were decreased to minimize moving low-value wood, and allowing export of the western red cedar was considered to increase the return. This alternative was less responsive to public concerns regarding effects to the roadless area and maximum financial efficiency.
- Another alternative considered was modifying Alternative B with a shorter road network, as described in Alternative D. Environmental effects would be similar to Alternative B. Since the effects of these alternatives would be someplace in between the effects disclosed for alternatives considered in detail, displaying them separately would not help to sharply define the issues or provide a clear basis for choice among the options.

Mitigation Measures

Mitigation

The analysis documented in this Draft SEIS discloses the possible adverse impacts that may occur from implementing the actions proposed under each alternative. Measures have been formulated to mitigate or reduce these impacts guided by the direction from the Forest Plan previously described in this chapter and in Chapter 1.

IDT specialists use on-the-ground inventories, computer (GIS) data, and aerial photographs to prepare the documents called unit cards for each harvest unit in the unit pool for the project. Similar cards are also prepared for each segment of road. Resource specialists include their concerns on the cards and then describe how the concerns are to be mitigated (if not completely avoided) in the design of each unit and road segment. These cards can be found in Appendix D and E.

Project-specific mitigation measures include modifying Unit 12 in Alternatives B, C and D to exclude brown bear foraging habitat. This measure is discussed in the Wildlife section of Chapter 3.

Applicable Forest Plan Standards and Guidelines, the "Best Management Practices" (BMPs) used to meet the requirements of the Clean Water Act, and project-specific mitigation measures are identified on the unit and road cards (Appendix D and E).

Monitoring

Monitoring

Monitoring activities can be divided into three broad categories: Forest Plan monitoring, routine implementation monitoring, and project-specific effectiveness monitoring. The National Forest Management Act requires that national forests monitor and evaluate their Forest Plans (36 CFR 219.11). The Forest Plan (Chapter 6) includes the monitoring and evaluation activities to be conducted as part of Forest Plan implementation.

Routine Implementation Monitoring

Routine implementation monitoring assesses whether the project was implemented as designed and whether or not it complies with the Forest Plan. The unit and road cards would be the basis for determining whether recommendations were implemented for various aspects of the Emerald Bay project.

Routine implementation monitoring is part of timber sale contract administration. The sale administrators and road inspectors ensure that the prescriptions contained on the unit and road cards are incorporated into contract documents and then monitor performance relative to contract requirements. Input by resource staff specialists, such as fisheries biologists, soil scientists, hydrologists and engineers, is regularly requested during this implementation monitoring process. These specialists provide technical advice when questions arise during project implementation.

Tongass NF staff and representatives from other Federal and State agencies annually conduct an interdisciplinary review of BMP implementation and effectiveness. The results of this and other monitoring are summarized in the Tongass NF Annual Monitoring and Evaluation Report. This report provides information about how well the management direction of the Forest is being carried out, and measures the accomplishment of anticipated outputs, activities and effects.

Project-specific Effectiveness Monitoring

Effectiveness monitoring seeks answers about the effectiveness of design features or mitigation measures in protecting natural resources and their beneficial uses. Monitoring records are kept by the responsible staff. Road use during and following harvest would be monitored to

determine whether closure features are sufficient to preclude motorized access, particularly ATV use.

Forest Plan Level Effectiveness Monitoring

Effectiveness monitoring and evaluation is used to determine whether standards and guidelines are achieving objectives, whether objectives are achieving goals, and includes an evaluation on whether there are significant changes in productivity of the land.

Findings Required By Law

Several of the laws and Executive Orders listed in Chapter 1 require project-specific findings or other disclosures. They apply to all alternatives considered in detail in this Draft SEIS.

Alaska National Interest Lands Conservation Act (ANILCA) of 1980; Section 810

Subsistence Evaluation and Findings: A subsistence evaluation was conducted for the four alternatives considered in detail for the Emerald Bay Draft SEIS, in accordance with Alaska National Interest Lands Conservation Act (ANILCA) Section 810. This evaluation indicates that the potential foreseeable effects from the alternatives in the Emerald Bay project area do not indicate a significant possibility of a significant restriction of subsistence uses for deer, bear, furbearers, marine mammals, waterfowl, salmon, other finfish, shellfish, and other foods such as berries and roots. See the Subsistence section in Chapter 3 of the Draft SEIS.

Bald Eagle Protection Act

Management activities within 330 feet of an eagle nest site are restricted by an Interagency Agreement between the Forest Service and the U.S. Fish and Wildlife Service to facilitate compliance with the Bald Eagle Protection Act. Alternatives B and D include road and LTF construction within 330 feet of a known bald eagle nest, and Alternative C may include helicopter yarding within 300 feet of a known bald eagle nest, depending on flight path. These activities would require a variance from the U.S. Fish and Wildlife Service.

Cave Resource Protection Act of 1988

There are no known occurrences of carbonate rock and associated cave resources within the project area. Field reconnaissance identified no areas of concern within the project area.

Clean Air Act of 1970 (as amended)

Emmissions anticipated from the implementation of any project alternative will be of short duration and are not expected to exceed State of Alaska ambient air quality standards (18 AAC 50).

Clean Water Act of 1972 (as amended)

The potential effects of the project on water resources and their beneficial uses are discussed in Chapter 3 of the Draft SEIS. The design of harvest units and roads for the alternatives was guided by standards, guidelines, and direction contained in the Forest Plan, Section 404 of the Clean Water Act, and applicable Forest Service manuals and handbooks. The unit and road Cards contain specific details on practices prescribed to prevent or reduce nonpoint sediment sources.

Congress intended the Clean Water Act of 1972 (Public Law 92-500) as amended in 1977 (Public Law 95-217) and 1987 (Public Law 100-4) to protect and improve the quality of water resources and maintain their beneficial uses. Section 313 of the Clean Water Act and Executive Order 12088 of January 23, 1987 address Federal agency compliance and consistency with water pollution control mandates. Agencies must be consistent with requirements that apply to "any govenmental entity" or private person. Compliance is to be in line with "all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution".

The Clean Water Act (Sections 208 and 319) recognized the need for control stategies for nonpoint source pollution. The National Nonpoint Source Policy (December 12, 1984), the Forest Service Nonpoint Strategy (January 29, 1985), and the USDA Nonpoint Source Water Quality Policy (December 6, 1986) provide a protection and improvement emphasis for soil and water resources and water-related beneficial uses. Soil and water conservation practices (BMPs) were recognized as the primary control mechanisms for nonpoint source pollution on National Forest System lands. The Environmental Protection Agency supports this perspective in their guidance, "Nonpoint Source Controls and Water Quality Standards" (August 19, 1987).

The Forest Service must apply Best Management Practices that are consistent with the Alaska Forest Resources and Practices Regulations to achieve Alaska Water Quality Standards. The site-specific application of BMPs, with a monitoring and feedback mechanism, is the approved strategy for controlling nonpoint source pollution as defined by Alaska's Nonpoint Source Pollution Control Strategy (October 2000). In 1997, the State approved the BMPs in the Forest Service's Soil and Water Conservation Handbook (FSH Handbook 2509.22, October 1996) as consistent with the Alaska Forest Resources and Practices Regulations. This Handbook is incorporated into the Tongass Land and Resource Management Plan.

The discharge of dredge or fill material from normal silviculture activities such as harvesting for the production of forest products is exempt from Section 404 permitting requirements in waters of the United States, including wetlands (404(f)(1)(A). Forest roads qualify for this exemption only if they are constructed and maintained in accordance with BMPs to assure that flow and circulation patterns and chemical and biological characteristics of the waters are not impaired (404)(f)(1)(E). The BMPs that must be followed are specified in 33 CFR 323.4(a). These specific BMPs have been incorporated into the Forest Service's Soil and Water Conservation Handbook under BMP 12.5.

Coastal Zone Management Act (CZMA) of 1972 (as amended)

The Coastal Zone Management Act of 1972, as amended, while specifically excluding Federal lands from the coastal zone, requires that a Federal agency's activities be consistent with the enforceable policies of a State's coastal management program to the maximum extent practicable when that agency's activities affect the coastal zone. The Forest Service makes this determination.

The Alaska Coastal Management Program incorporated the Alaska Forest Resources and Practices Act (Forest Practices Act) of 1979 as the applied standards and guidelines for timber harvesting and processing. The Forest Service Standards and Guidelines, BMPs, and mitigation measures described in the Emerald Bay Draft SEIS meet or exceed the level of protection provided by the enforceable policies of the Forest Practices Act.

Additional information requirements were agreed to on March 2, 2000 when an interagency Memorandum of Understanding (MOU) was signed.

Based on the analysis in the Final EIS, review of the Forest Practices Act, and comments from State agencies on the Draft EIS, the Forest Service determined that the Emerald Bay project is consistent to the maximum extent practicable with the enforceable policies of the Alaska Coastal Management Program. The State objected to this determination in 2001.

Consumers, Civil Rights, Minorities and Women

No negative impacts to the civil rights of individuals or groups, including minorities and women, are anticipated to be associated with this project. Additional information can be found in the Forest Plan FEIS Chapter 3 and Appendix H.

Endangered Species Act (ESA) of 1973 (as amended)

Actions authorized in the action alternatives are not anticipated to have a direct, indirect, or cumulative adverse impact on any threatened or endangered species in the Emerald Bay project area. The National Marine Fisheries Service has concurred that the actions described for the proposed project are not likely to adversely affect any aquatic threatened or endangered

species. Consultation was initiated with the U.S. Fish and Wildlife Service, and no terrestrial or threatened or endangered species are listed for the Emerald Bay Timber Sale project area (FS Mike Brown memo, 10/17/2000). A combined Biological Assessment (BA) and Biological Evaluation (BE) was prepared for the Emerald Bay Timber Sale, as required by Section 7 of the Endangered Species Act (ESA), as amended, and the USDA Forest Service Threatened, Endangered and Sensitive Plant and Animal Species Policy (FSM 2670). Additional surveys were completed in 2003 and the BA/BE was updated. The complete BA/BE is included as Appendix B of the Draft SEIS.

Executive Order 12898 (environmental justice)

Executive Order 12898 directs Federal agencies to state clearly in the EIS whether a disproportionately high and adverse human health or environmental impact on minority populations, low-income populations or Indian tribe is likely to result from the proposed action and any alternatives. The Executive Order specifically directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife. The issue of environmental justice has been addressed through the subsistence and socioeconomic analyses in Chapter 3. Environmental justice was not identified as an issue for the Emerald Bay project because: 1) the Socioeconomic Panel's evaluation of the Forest Plan alternatives effect on the community of Meyers Chuck, 2) the Forest Plan determination that Selected Alternative 11 would be similar in its effects to the rated alternatives, 3) the Emerald Bay project falls within the scope of the Forest Plan, and 4) the Emerald Bay project is not likely to have a significant possibility of a significant restriction on subsistence resources, as discussed in the subsistence section of Chapter 3.

Executive Order 11988 (floodplains)

Executive Order 11988 directs Federal agencies to take action to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. The numerous streams in the project area make it impossible to avoid all floodplains during timber harvest and road construction. The design of the proposed developments and the application of BMPs combine to minimize adverse impacts on floodplains.

Executive Order 11990 (wetlands)

Executive Order 11990 requires Federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands. Alternative C avoids wetlands by proposing no roads and prescribing 100 percent uneven-aged helicopter yarding. Roaded access to the project area cannot avoid wetlands. Techniques and practices required by the Forest Service serve to maintain the wetland attributes including values and functions. Soil moisture regimes and vegetation on some wetlands may be altered in some cases; however, these altered acres would still be classified as wetlands and function as wetlands in the ecosystem. It is estimated there would be only minimal loss of wetlands with the low-impact road and silvicultural prescriptions proposed in Alternative D. Alternative B would have the greatest impact on wetlands.

Executive Order 12962 (aquatic systems and recreational fisheries)

Executive Order 12962 requires Federal agencies to evaluate the effects of proposed activities on aquatic systems and recreational fisheries. The Alternatives attempt to minimize the effects upon aquatic systems through project design, watershed assessment, application of Forest Plan Standards and Guidelines, BMPs, and site-specific mitigation measures. Recreational fishing opportunities would remain essentially the same because aquatic habitats are protected through implementation of BMPs and riparian buffers.

Executive Order 13007 (Indian sacred sites)

Executive Order 13007, Indian Sacred Sites, provides presidential direction to Federal agencies to give consideration to the protection of American Indian sacred sites and allow access where feasible. In a government-to-government relationship, the tribal government is responsible for notifying the agency of the existence of a sacred site. A sacred site is defined as a site that has

sacred significance due to established religious beliefs or ceremonial uses, and which has specific, discrete, and delineated location, which has been identified by the tribe. Tribal governments or their authorized representatives have not identified any specific sacred site locations in the project area.

Magnuson-Stevens Fishery Conservation and Management Act of 1996

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act states that all Federal agencies must consult the National Marine Fisheries Service (NMFS) for actions or proposed actions that may adversely affect essential fish habitat (EFH). The Act promotes the protection of EFH through review, assessment, and mitigation of activities that may adversely affect these habitats.

The potential effects of the Emerald Bay Timber Sale project on essential fish habitat have been evaluated. For specific information regarding essential fish habitat and the potential impacts refer to the Emerald Bay project area Fisheries Resource Reports and the Fisheries Section of Chapter 3 of the Draft SEIS. Analysis completed in the cumulative effects sections for fisheries, soils, and water indicate no significant changes to Riparian Management Areas (RMAs) and floodplains as a result of proposed management activities.

The following factors were considered in evaluating the potential effects on essential fish habitat:

- Forest Plan Standards and Guidelines for process group riparian buffers have been applied in all instances on Class I, II, and III streams;
- BMPs described in the unit and road cards provide assurance of water quality and aquatic habitat protection for all freshwater streams and marine waters affected by the project;
- Approximately 15 acres of slopes greater than 72 percent have been field reviewed by professional soil scientists who determined harvest of these slopes can be accomplished with no damage to other resources;
- Road construction includes log stringer bridges for all crossings of Class I or II streams; and
- Logs would be loaded directly onto a barge so little bark debris would accumulate on the subtidal substrate.

Based on the above factors, the risk of measurable impact on essential fish habitat has been minimized in the project area.

The Emerald Bay Draft EIS was completed before the EFH consultation agreements were signed with the NMFS. To comply with the EFH agreement, the Forest Service contacted NMFS on October 17, 2003. The formal consultation process will start when the USFS sends a copy of the revised EFH assessment and a Draft SEIS. Documentation of the consultation process will be included in the Final SEIS.

National Forest Management Act (NFMA) of 1976 (as amended)

The Forest Plan complies with all resource integration and management requirements of 36 CFR 219 (219.14 through 219.27). Application of Forest Plan direction for the Emerald Bay Timber Sale project ensures compliance at the project level. All required interagency review and coordination has been accomplished. No created openings would exceed 100 acres.

All alternatives fully comply with the Forest Plan and FSM 2410.3, R10 Supplement 2400-2002-1 (5/7/2002). The Emerald Bay project incorporates all applicable Forest Plan Standards and Guidelines, and management area prescriptions as they apply to the project area, and complies with Forest Plan goals and objectives.

National Historic Preservation Act of 1966 (as amended)

Heritage resource surveys of various intensities have been conducted in the project area

following inventory protocols approved by the Alaska State Historical Preservation Officer (SHPO). Consultation with the SHPO has been completed, in compliance with the provisions of 36 CFR, part 800. Section 106 directs Federal agencies to consider the effects to significant sites in consultation with tribal governments, through out the planning process. SHPO has concurred that no historic properties would be affected by the proposed activities. Forest Service timber sale contracts contain enforceable measures for protecting any undiscovered heritage resource that might be encountered during sale operations.

Tongass Timber Reform Act (TTRA) of 1990

Harvest units were designed with no less than 100-foot buffer zones for all Class I streams and Class II streams which flow directly into Class I streams as required in Section 103 of the TTRA. The actual widths of these buffers follow Forest Plan Riparian Standards and Guidelines that greatly exceed TTRA requirements.

Federal and State Permits

Federal and State permits necessary to implement the authorized activities are listed at the end of Chapter 1.

Figure 2-1: Alternative A Map

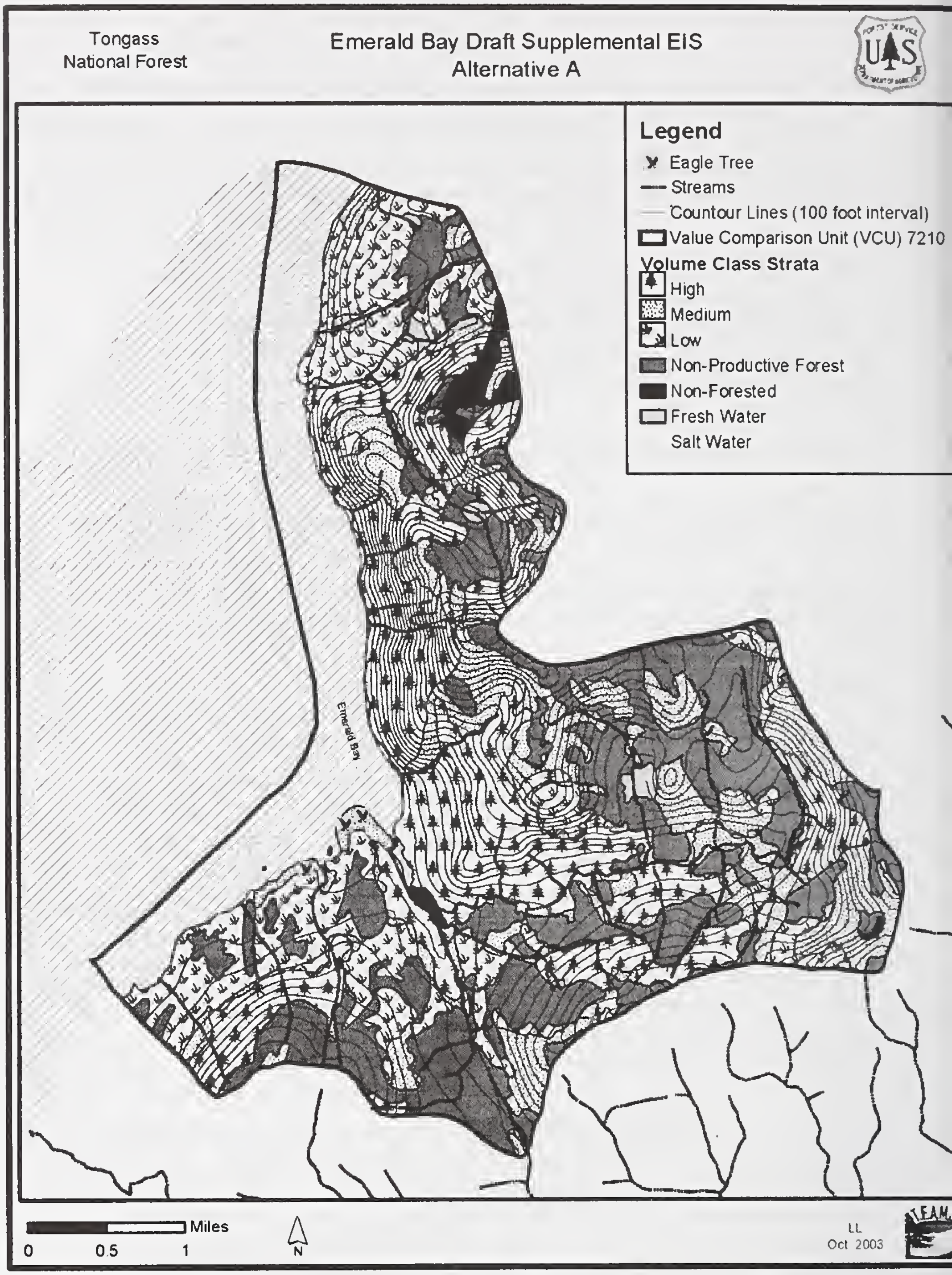


Figure 2-2: Alternative B Map

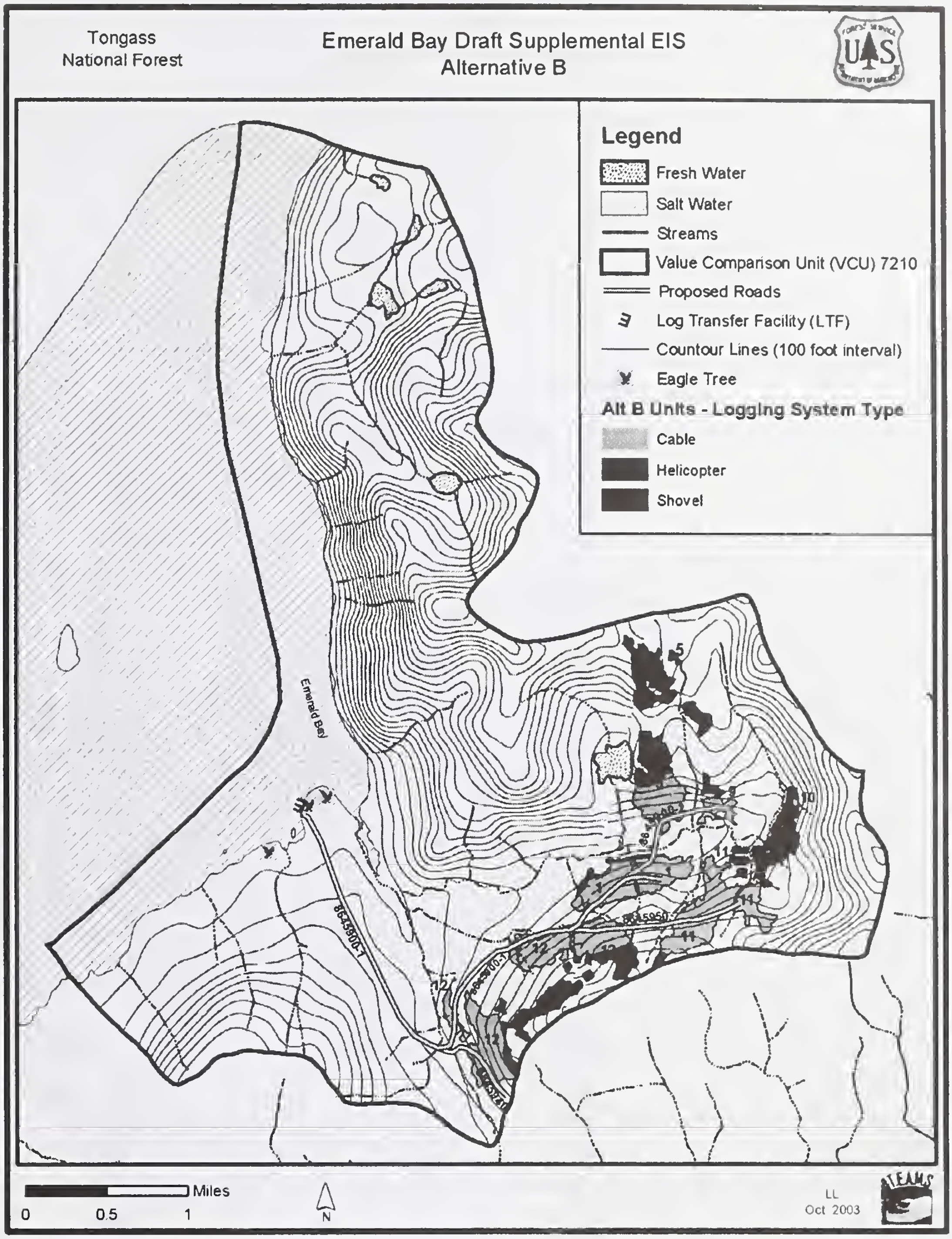


Figure 2-3: Alternative C Map

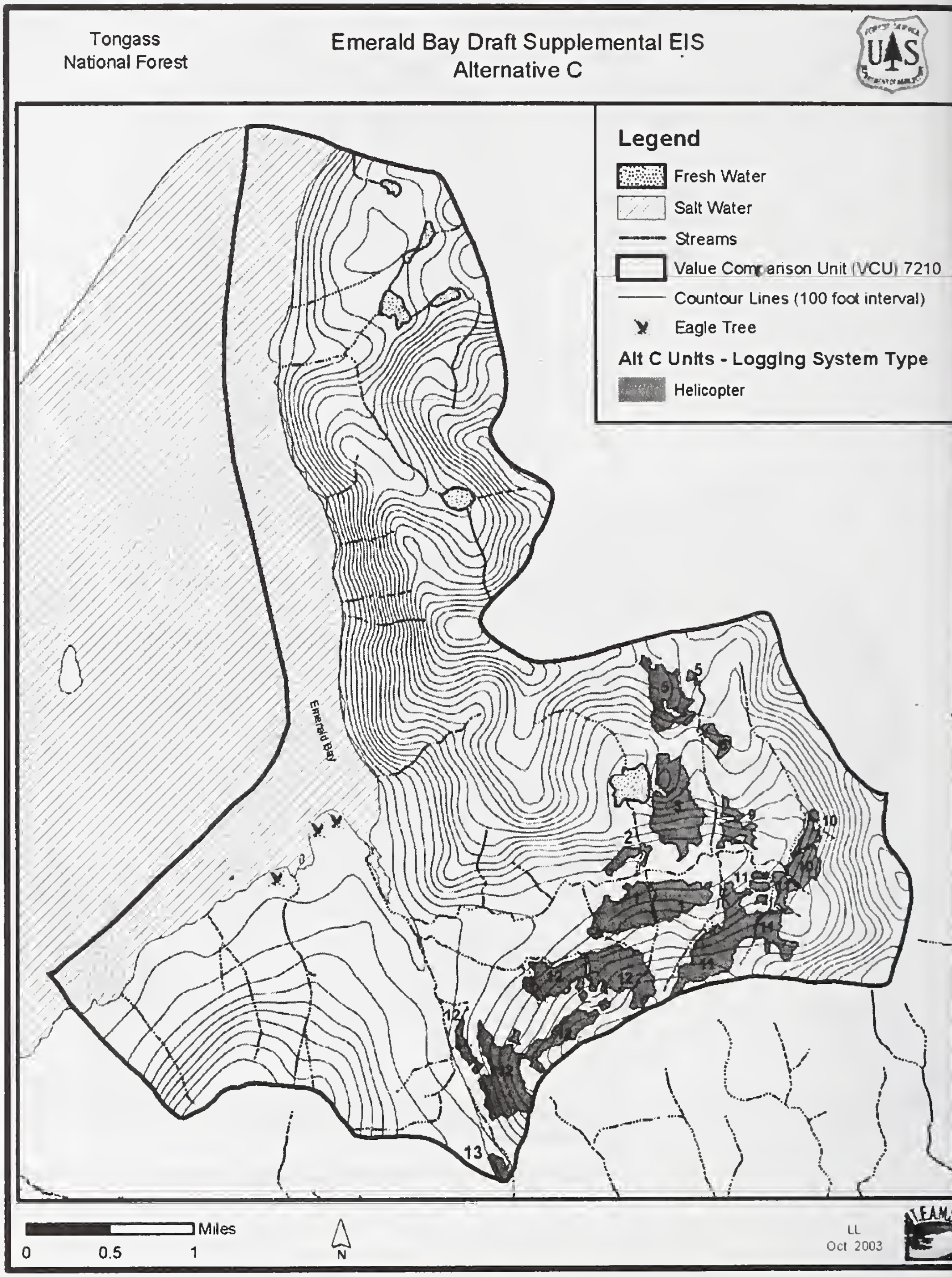
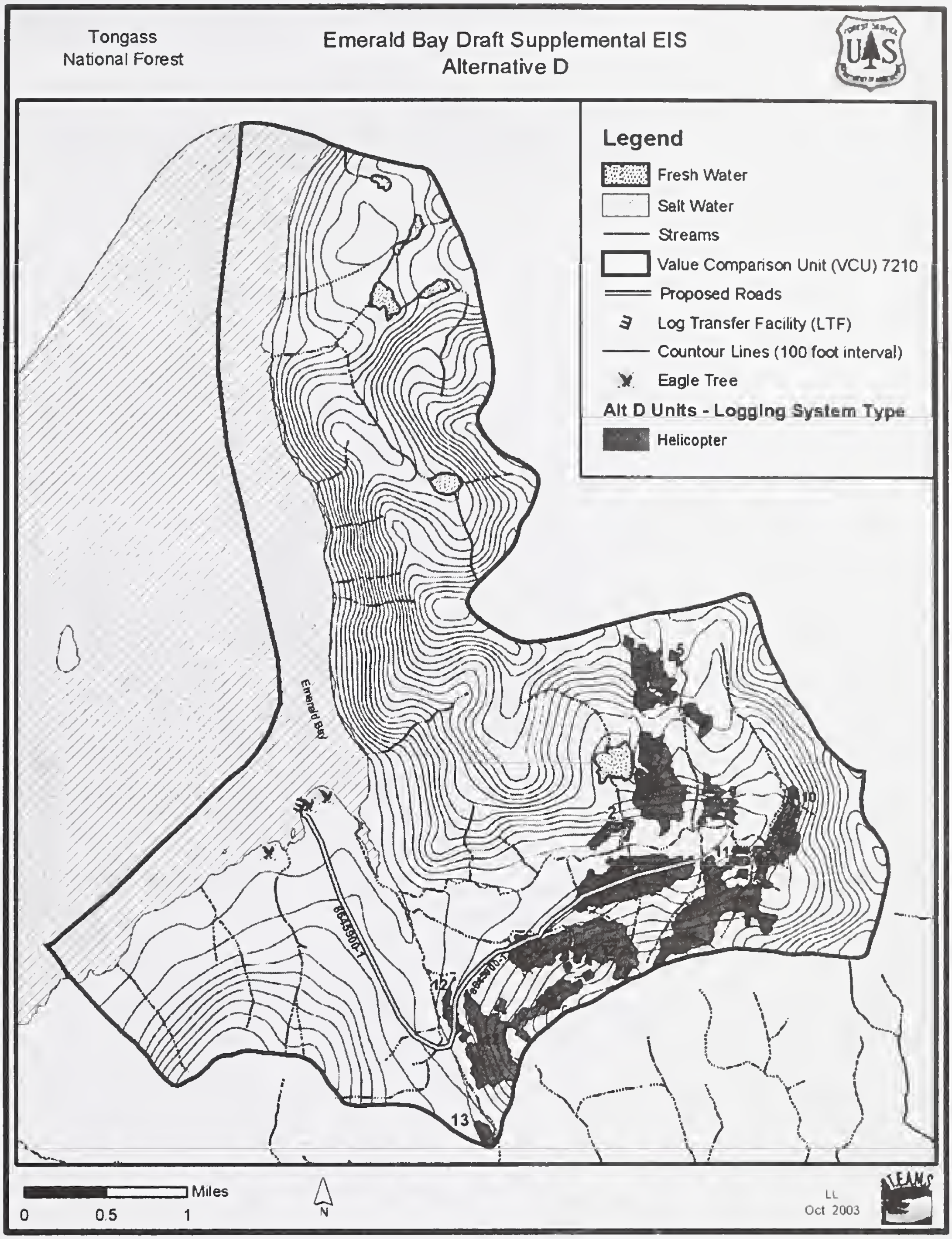


Figure 2-4: Alternative D Map



Chapter 3

Environment and Effects

Chapter 3

Environment and Effects

Introduction

This chapter provides information concerning the existing environment of the Emerald Bay project area, and the potential consequences to that environment. It also presents the summary of scientific data and analytical basis for the comparison of alternatives presented in Chapter 2. Each resource potentially affected by the Proposed Action or alternatives is described by its current condition and uses.

Following each resource description is a discussion of the potential effects (environmental consequences) to the resource associated with the implementation of each alternative. All significant or potentially significant effects, including direct, indirect and cumulative effects, are disclosed. Effects are quantified where possible, and qualitative discussions are also included. The means by which potential adverse effects would be reduced or mitigated are described.

The discussions of resources and potential effects take advantage of existing information included in the Forest Plan FEIS, other project EISs, project-specific resource reports and related information, and other sources as indicated. Where applicable, such information is briefly summarized and referenced to minimize duplication. The planning record for the Emerald Bay project includes all project-specific information, including resource reports and other results of field investigations. The record also contains information resulting from public involvement efforts. The planning record is located at the Ketchikan-Misty Fiords Ranger District Office in Ketchikan, Alaska, and is available for review during regular business hours. Information from the record is available upon request.

Land Divisions

The land area of the Tongass NF has been divided in several ways to describe the different resources and allow analysis of how they may be affected by Forest Plan and project-level decisions. These divisions vary by resource since the relationship of each resource to geographic conditions and zones also varies. The allocation of Forest Plan land use designations (discussed in Chapter 1) is one such division. The two divisions important for the present effects analysis are value comparison units and wildlife analysis areas.

Value Comparison Units (VCUs)

These are distinct geographic areas, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow major watershed divides. The Emerald Bay project area consists of one VCU, number 7210, as discussed in Chapter 1. Chapter 1 also includes a map showing the location of VCU 7210.

Wildlife Analysis Areas (WAAs)

These are Forest Service land divisions that correspond to the "Minor Harvest Areas" used by the Alaska Department of Fish and Game. There are approximately 190 WAAs that apply to the Tongass NF. WAA 1817 incorporates the Emerald Bay project area. Information estimated by WAA is used in the wildlife and subsistence analysis. A map depicting WAA 1817 is included in Appendix C.

Analyzing Effects

Environmental consequences are the effects of implementing an alternative on the physical, biological, social and economic environment. The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) includes a number of specific categories to use for the analysis of environmental consequences. Several are applicable to the analysis of the proposed project and alternatives, and form the basis of much of the analysis that follows. They are explained briefly here.

Direct, Indirect and Cumulative Effects

Direct environmental effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity, but would be significant in the foreseeable future. Cumulative effects result from incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time. The geographical area within which effects of activity are analyzed is the project area, VCU 7210, unless otherwise identified for a resource.

Past and Present Actions

There has been little past activity within the project area. Fourteen acres of the medium Old-growth Reserve were harvested in the late 1930s. Historically, single-tree beach harvest has occurred in scattered locations within the southern portion of the Cleveland Peninsula.

The Frosty Bay Timber Sale, which was harvested in 1993 and is located 13 miles north of the Emerald Bay project area, is in a separate watershed. Frosty Bay is the closest ground-disturbing activity that has occurred to the project area. The sale harvested 1,184 acres and 12 miles of road were constructed.

A large parcel of private land is located south of Meyers Chuck. This land could be developed for timber production in the future. The landowner has expressed interest in exchanging this parcel with other National Forest System lands. If that were to happen, management of the parcel would be consistent with the Semi-Remote Recreation LUD adjacent to it.

The effects of these actions on resources within the project area are expected to be minor.

Reasonably Foreseeable Future Actions

An analysis of cumulative effects must also include "reasonably foreseeable future actions" (40 CFR 1508.7). For the Emerald Bay project action alternatives, the sale is scheduled for offer in 2005.

Potential additional projects on National Forest System land in the general vicinity of the Emerald Bay project include:

- The proposed Swan-Tyee Powerline, which is 19 miles north of the project area
- The Canal-Hoya Timber Sale, 22 miles north (sold in 2000)
- The Kuakan Timber Sale, located 10 miles to the north (sold in 2000)
- The Sunny Bay/Frosty Bay Timber Sales located 3 to 10 miles north (proposed for 2008)
- The Whale Tail Timber Sale located on Etolin Island, 19 miles to the northwest (proposed for 2010)

- The Recreational Commercial Guide EIS

The effects of the activities associated with the Emerald Bay project are not expected to add to the effects of, or be affected by, these projects. None of these actions would be located within VCU 7210 or the project area. All of these projects are separated from the Emerald Bay project area by topographical barriers and by a distance of at least 10 miles, with the exception of the Pt. Warde/Sunny Bay Sale, which is not scheduled until 2010. There is no non-National Forest System land within the vicinity of Emerald Bay.

Unavoidable Adverse Effects

Unavoidable adverse environmental effects are those that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. Many adverse effects can be reduced, mitigated or avoided by limiting the extent or duration of activities. The interdisciplinary procedure used to identify specific harvest units and roads is designed to eliminate or lessen significant adverse consequences. The application of Forest Plan Standards and Guidelines, Best Management Practices, project-specific mitigation measures, and monitoring are all intended to further limit the extent, severity, and duration of potential effects. Regardless of the use of these measures or the alternative selected, some adverse effects will occur.

Short-term Use and Long-term Productivity

Short-term uses and their effects are those that occur annually or within the first few years of project implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services long after the project has been implemented. Under the Multiple-Use Sustained Yield Act, and the National Forest Management Act, all renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be reestablished and grown again if the long-term productivity of the land is maintained. This long-term productivity is maintained through the application of the resource protection measures just described, in particular those applying to the soil and water resources. These are also discussed throughout the chapter.

Irreversible and Irretrievable Commitments

Irreversible commitments describe a loss of future options. Irreversible applies primarily to the effects of use of nonrenewable resources such as mineral extraction or destruction of a heritage resource site. Once these resources are gone, they cannot be replaced. Irreversible can also apply to factors such as soil productivity that are renewable only over long periods of time.

Irretrievable commitments apply to the loss of production, harvest or use of natural resources. For example, some or all of the timber production from an area is lost irretrievably while an area is serving as a winter sports site. The production lost is irretrievable, but the action is not irreversible because if the use changes, it is possible to resume timber production.

The use of these terms to include in discussions of environmental consequences is found in 40 CFR 1502.16. The definitions above are found in the Forest Service handbook (FSH 1909.15, 05). The disclosure of effects in this chapter is organized by direct, indirect and cumulative effects. Where necessary, irreversible commitments are identified, but generally timber harvest and associated activities are considered irretrievable commitments of resources.

Available Information

Much of the Tongass NF resource data resides in an electronic database formatted for a geographic information system (GIS). GIS software is used to assist in the analysis of these data. GIS data is available in tabular (numerical) format, and as plots displaying data in map format. For this EIS, the maps and most of the numerical analysis are based on updated GIS resource data. There is less-than-complete knowledge about many of the relationships and conditions of wildlife, fish, forests, jobs and communities. The ecology, inventory and management of a large forest area are complex and developing sciences. The biology of

wildlife species prompts questions about population dynamics and habitat relationships. The interaction of resource supply, the economy, and communities is the subject matter of an inexact science. However, the basic data and central relationships are sufficiently well established in the respective sciences for the deciding official to make a reasoned choice between the alternatives, and to adequately assess and disclose the possible adverse environmental consequences.

Other Resources

Several resources and uses of the project area are likely to remain unaffected by the Proposed Action or alternatives, or would not be affected to a significant degree. Resources or uses for which no measurable effects were identified are discussed briefly here.

Air Quality

All of the action alternatives would have limited, short-term effects on ambient air quality. Such effects, in the form of vehicle emissions and dust, are likely to be indistinguishable from other local sources of airborne particulates, including other motor vehicle emissions, dust from road construction and motor vehicle traffic, residential and commercial heating sources, marine traffic, and emissions from burning at sawmills. The action alternatives could result in short-term supplies of raw wood products to local mills. It is the responsibility of the mill owner or sort yard operator to ensure that mill emissions are within legal limits.

Facilities

There are no logging camps or Forest Service administrative sites in the Emerald Bay project area. The Ketchikan-Misty Fiords Ranger District office is located approximately 40 miles south of the project area in Ketchikan, Alaska.

Land Status

Under the Alaska Statehood Act of 1959, the State of Alaska is entitled to a certain amount of Federal land. The State was also allowed to identify for selection more acreage than would ultimately be conveyed to State ownership. The Alaska Native Claims Settlement Act granted Alaska Native corporations similar selection rights. There are no State or Alaska Native land selections or claims within the project area.

Minerals

There are no known mineral occurrences of commercial value within the Emerald Bay project area. Bureau of Land Management records indicate no mining claims or patented mining claim groups within the Emerald Bay project area.

The Proposed Action would have no direct or indirect impact on mineral resources. In general, the project could affect mining activities only by providing easier access for mapping and surveying due to new road construction in less developed or underdeveloped areas. Geologic mapping could also be enhanced by increased exposure due to road construction and quarry development.

Plans of Other Agencies

The CEQ regulations implementing NEPA require a determination of possible conflicts between the Proposed Action and the objectives of other Federal, State, and local land use plans, policies, and controls for the area. The major land-use regulations of concern are Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA), the Coastal Zone Management Act (CZMA), and the State of Alaska's Forest Practices Act. ANILCA Section 810 requirements pertain to subsistence; these are discussed in the Subsistence section of this chapter.

The CZMA was passed by Congress in 1976 and amended in 1990. This law requires Federal agencies conducting activities or undertaking development affecting the coastal zone to ensure that the activities or developments are consistent with approved State coastal management programs to the maximum extent practicable. The State of Alaska passed the Alaska Coastal Management Act in 1977, to establish a program that meets the requirements of the CZMA. In 1990 the State passed a revised Alaska Forest Practices Act. For Federal timber sales, the

Forest Practices Act provides the standards to be used for a determination of consistency with the Alaska Coastal Management Act. It also provides specific stream buffer requirements.

The Forest Service has evaluated the alternatives to ensure that the activities and developments affecting the coastal zone are consistent with approved coastal management programs to the maximum extent practicable. The Forest Plan Standards and Guidelines, and management practices incorporated into the Emerald Bay project meet or exceed those indicated by the Alaska Coastal Management Act and the Alaska Forest Practices Act. The layout of all proposed harvest units would comply with Forest Plan Standards and Guidelines for riparian management areas, which meet or exceed the stream buffer requirements in the Forest Practices Act.

Biodiversity and Old-growth

Affected Environment

Biodiversity

National Forest Management Act (NFMA) regulations (36 CFR 219) define diversity as the distribution and abundance of different plant and animal communities and species. Biological diversity, or biodiversity, refers not only to the variety of organisms in an area; it also includes their genetic composition, the complex pathways that link organisms to one another and to the environment, and the processes that sustain the whole system. Biodiversity can be evaluated at different scales, ranging from genetic and species diversity to landscape diversity.

The risk of genetic and species loss is higher if the structure, composition, or function of habitats are compromised. An example of such a compromise might be fragmentation of large blocks of suitable habitat into smaller isolated blocks that separate small populations from each other. In managing forest ecosystems, biodiversity is evaluated at larger scales because the maintenance of functioning ecosystems would better conserve the species associated with them.

The connectivity, or habitat corridors, between habitat blocks in a landscape can be very important for maintaining diversity (Noss 1983). Corridors can function in different ways, depending on width and other characteristics. Corridor width can be important: some "interior species" (species that do not inhabit the outer edges of old-growth forests) will not live in or even migrate through extensive lengths of unsuitable habitat (Forman and Godron 1981).

The State recently completed the Central Southeast Alaska Area Plan, which identifies the Spacious Bay-Ernest Sound area as a "bio-geographical pinchpoint" for deer, brown bear, and wolves (Garland 2001).

Viability Analysis

Project Level Viability Analysis

The NFMA regulations also include the concept of wildlife (vertebrate) species viability, requiring that fish and wildlife habitats be managed to maintain viable populations of species in the planning area (national forest). A viable population is defined as one having "the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area" (36 CFR 219.19). Wildlife habitat planning and management for viable populations is carried out in the context of overall multiple-use objectives.

Viability is discussed here rather than in the Fisheries Resources and Wildlife sections due to the key role that old-growth forest habitat plays in maintaining viability across the Tongass NF. The Forest Plan includes, as the foundation of its viability strategy, a forest-wide system of Old-growth Habitat Reserves (blocks) that maintain the integrity of the old-growth ecosystem.

The 1997 Forest Plan contains a comprehensive two-part conservation strategy using a system of Old-growth Reserves (OGRs) designed to provide old growth habitats in combination with other non-development Land Use Designations (LUD) to maintain viable populations of native and desired non-native fish and wildlife species and subspecies that may be associated with old-growth forests. This strategy, in addition to the implementation of the 1997 Forest Plan Standards and Guidelines, was developed to maintain species viability.

Under the Forest Plan, project areas are not expected to independently maintain viable populations, but do need to consider project-level contributions to the Forest-wide strategy. This includes maintaining the integrity of Old-growth Habitat Reserves, maintaining other components of the overall strategy (such as riparian management areas, the beach and estuary fringe, and species-specific habitats), and considering additional old-growth habitat and corridor needs within the project area.

Old-growth Forest

Old-growth forest contains trees of many ages, sizes, and conditions, including dead standing trees (snags) and trees with dead tops. Tree establishment largely depends on large woody debris (logs and stumps) (Harmon 1986, Harmon and Franklin 1989) and gap formation (Alaback 1988). Woody debris provides micro-sites for seedlings to grow on, and gaps (openings) created by windthrow or other disturbances allow light to penetrate to the forest floor. The process of trees dying and being replaced is continuous; in any one year, a portion of the trees in individual stands is likely to blow down (Harris 1989). Generally, the forest is a mosaic of older and younger trees, dynamically changing yet remaining stable as a forested ecosystem (Bormann and Likens 1979, Alaback 1988, Schoen et al. 1988, Franklin 1990).

Old-growth forest is important as wildlife habitat for old-growth associated species such as Sitka black-tailed deer, marten, black bears, Vancouver Canada geese, and cavity or snag-dependent species such as flying squirrels, woodpeckers, and owls. The combination of a dense canopy with scattered small openings (typically 20 to 40 feet across) allows forage to grow under the openings, while the large limbs within the canopy intercept enough snowfall to provide winter food and thermal cover for deer and other species. The large, dense stems also provide some measure of thermal insulation in the winter. Large dead or defective trees provide nesting sites for marten, owls, eagles, wrens and chickadees, as well as feeding sites for woodpeckers, sapsuckers, brown creepers and others.

The value of old-growth forest for wildlife habitat transcends individual stands. Large, contiguous, unfragmented blocks of old-growth forest are important to forest interior species. Large old-growth blocks provide expansive hunting territories and protection from predators, and promote genetic mixing among populations that would be less likely to breed if they were spatially separated by forest fragmentation. Many wildlife species use these old-growth blocks for migration corridors throughout the year.

Existing Condition

The analysis area for old-growth is VCU 7210. The Emerald Bay project area (VCU 7210) contains part of a medium Old-growth Habitat Reserve (Old-growth Habitat LUD). This reserve also occurs in VCUs 7200 (to the south) and 7220 (to the east), and is adjacent to a small Old-growth Reserve in VCU 7220, making a continuous habitat reserve of 21,250 acres. The medium Old-growth Reserve is 12,439 acres in size, and contains 6,648 acres of productive old-growth forest with 6,402 acres of high-volume old growth. (Details of the small reserve in VCU 7220 are displayed in the Environmental Consequences portion of this section.) This medium Old-growth Reserve makes up 67 percent of the project area (Figure 1-2). The project area is bounded on the south by the remainder of this medium reserve and a portion of the small reserve in VCU 7220. The remainder of this small reserve bounds the eastern boundary of the project area. On the north, the project area is bounded by lands in the Timber Production and Modified Landscape land use designations. Maps in Appendix C display the LUDs, VCUs, and WAA 1817.

The Forest Plan allows boundary adjustments or relocations (within a VCU) of small reserves, as long as the habitat criteria are met. No changes are proposed to small Old-growth Habitat Reserves for the Emerald Bay project. Fish and Wildlife Service and Alaska Department of Fish and Game biologists met in October 1998 to discuss the location of OGRs adjacent to the Emerald Bay project area and at that time it was decided to look at the larger Cleveland Peninsula. The next interagency meeting regarding OGRs, January, 1999, recommended one change within the WAA; the small OGR in VCU 7180. This OGR is well outside the project area and the recommendation is not carried forward in this analysis.

The second component of the old growth strategy deals with the amount and connectivity of old growth outside the reserves. These areas of old growth maintain natural diversity for non-migratory species, provide important connectivity between OGRs, and promote genetic mixing among populations that are unlikely to cross large areas of non-forest or young forest stands. Table Old Growth-1 displays the distribution of old growth in the area.

Table Old Growth-1
Old Growth in the Project Area (VCU 7210), POG = Productive Old Growth

	Acres	Percent of the Project Area
POG - high volume	2,347	30%
POG – medium volume	1,608	20%
POG – low volume	1,302	17%
Unproductive OG	2,404	31%

Source: Forest Service, GIS. There is approximately 1 percent each of freshwater and non-forest

Habitat Connectivity

Habitat connectivity should be addressed at the project level to assess whether blocks of contiguous old-growth forest habitat between large and medium reserves and other natural setting LUDs are maintained (USDA Forest Service 1997, pg. 4-120). The maintenance of habitat corridors can be important to minimize isolation and decline of wildlife species associated with the old-growth blocks (Harris 1984, 1985; Hunter 1990). Riparian areas, the beach fringe, estuaries and other areas (including stands deemed inoperable for timber harvest because of unstable soils, steep slopes, economic isolation, or other factors) can all provide connectivity between old-growth blocks in addition to Old-growth Habitat Reserves.

Within the project area, approximately 14 acres of selective timber harvest occurred about 60 years ago, near the beach in Emerald Bay. Currently, the forests on the project area have a relatively (naturally) fragmented distribution. The majority (74 percent) of the productive old growth and the largest forest blocks in the project area are in the medium Old-growth Reserve (Fig 1-2). There are no roads in the project area. Fragmentation in the project area is a result of natural vegetation structure and natural disturbance regimes.

Environmental Consequences

Effects of Alternatives on Biodiversity

Following clearcut logging of old-growth forest, the stands that subsequently develop are even-aged (Harris and Farr 1974) and tend to contain a higher percentage of Sitka spruce and a lower percentage of cedars. Clearcutting differs from natural disturbances in that it represents a large-scale change (up to 100 acres, typically) rather than dispersed small (1 to 20 acres, typically) partial blowdown patches. It also differs in that nearly all trees are felled, whereas in natural disturbances many trees remain standing or partially standing (Hansen et al. 1991). Another review found that clearcut sizes had a normal distribution around 45 to 50 acres, but most blowdown patches were less than 50 acres (Nowacki and Kramer 1998). Only Alternative B proposes clearcutting.

Following selection harvests, stands maintain many of their old-growth characteristics. A minimum of three age-classes remains spread evenly over diameter classes, providing high structural diversity. Single-tree selection simulates natural disturbance caused by the death of scattered trees, while group selection reflects the natural gap-dominated disturbance typical of old-growth forests. Both systems leave legacy trees in harvest units and help maintain important habitat components such as lichen, fungi, and other taxa (Swanston et al, 1996). All action alternatives propose some level of selection harvest.

Direct Effects to Stand Structure

Under Alternative B, 396 acres would be harvested by clearcut and 205 acres by single-tree selection methods (Table Old Growth-3). The proposed clearcut harvest would differ

somewhat from traditional clearcutting because 10-20 percent of the original stand structure of each unit that contains high-value marten habitat would be retained. The retained trees would most likely be in clumps or "islands" within a unit, or may be more evenly spaced. In either case, the actual opening created would be smaller than the unit size indicates, and mature trees would remain as part of the unit.

Alternatives C and D propose no clearcutting. All 620 acres would be managed on an uneven-aged basis using selection harvest systems. Stands would be managed to develop and maintain a distribution of diameter classes typical of an uneven-aged system, in which each diameter class contains approximately half the number of trees per acre as the next small diameter class.

Alternative D would harvest the same number of acres, using the same silvicultural systems as Alternative C.

Direct Effects Related to Viable Populations

The Forest Plan FEIS conducted viability analysis and concluded that implementation of the Forest Plan will provide reasonable assurance of maintaining viable and well-distributed populations of wildlife across the Tongass NF for 100 years. This analysis and conclusion incorporated the assumption of full implementation of the Forest Plan for 10 decades. Therefore, any project that is consistent with the Forest Plan is a subset of the Forest-wide analysis and will, by definition, also provide reasonable assurance of maintaining viable wildlife populations. However, management activities need to consider the project-level contributions to the Forest-wide strategy. This analysis follows.

Direct Effects Related to Old Growth

The Forest Plan, as previously discussed, includes a Forest-wide old growth conservation strategy designed to provide reasonable assurance of maintaining adequate habitat to maintain viable fish and wildlife populations. For Emerald Bay, the medium Old-growth Habitat Reserve, which occurs within and to the south of the project area, is the main component of the Forest-wide habitat conservation system. In addition, all applicable Forest Plan Standards and Guidelines that are also integral parts of the strategy, such as Riparian Management Areas, beach fringe buffers, landscape connectivity, and marten guidelines are incorporated into the Emerald Bay action alternatives. The exception is a road and LTF, in Alternatives B and D, located in the beach fringe and old-growth reserve. Roads are allowed in these areas only when there are no other alternatives. There are two proposed 1/5-acre rock pits that would be located in the OGR in Alternatives B and D; one would be located near the beach. No timber harvest would occur within the OGR except for the road width clearing.

Alternative B has a total of 41 acres associated with road clearing; 14 acres would be in the OGR and 27 acres would be in the Timber Production LUD. Alternative D has a total of 25 acres associated with road clearing; 14 acres are in the OGR and 11 acres are in the Timber Production LUD. The LTF proposed in Alternatives B and D would be within the OGR and would affect less than one acre.

The logging camp would not be located in the OGR, it would be located further inland or would be an off-shore, floating camp (see Chapter 2). Log sort yards would not occur in the OGR and logs would be staged outside of the OGR while waiting transfer to the barge LTF.

The Forest Plan includes specific criteria for designing and locating small, medium and large Old-growth Habitat Reserves (Forest Plan, Appendix K). The small Old-growth Habitat Reserves adjacent to the project area were reviewed during interagency and interdisciplinary meetings. No changes are proposed for the small reserves in adjacent VCU 7220 (Table Old Growth-2). There was one change, discussed previously, for VCU 7180. While this is within the WAA, it is well outside of the project area and has not been carried forward.

Table Old Growth-2
Comparison of Mapped Small Old-growth Habitat Reserves

	VCU 7220
Small Reserve Acres:	
Forest Plan	8,811
Required (min.)	5,050
Proposed Change	None
POG[1] Acres:	
Forest Plan	2,964
Required (min.)	2,525
Proposed Change	None

[1]POG = Productive Old Growth
Source: Forest Service GIS

Maintaining old growth outside of OGRs is also an important component of the conservation strategy. Productive old growth is old-growth forest having greater than 8,000 board feet per acre. The action alternatives would reduce the amount of productive old growth within the project area by 1-3 percent. Table Old Growth-3 displays the breakdown of old growth remaining within the project area after harvest by volstrata.

Table Old Growth-3
Percent POG remaining in VCU 7210 by Alternative

Alternative	Percent High Volume POG	Percent Medium Volume POG	Percent Low Volume POG	Percent Unproductive Old Growth
A	30	20	17	31
B	27	18	16	30
C	27	17	16	30
D	27	17	16	30

Source: Forest Service GIS

Forest-level monitoring in 2001 found that high volume stratum have been harvested disproportionately to its abundance (Tongass Monitoring and Evaluation Report, 2001, pg 2-7). As shown below, about 30 percent of the project area is in high volume old growth, while about 40 percent of the proposed harvest is high volume old growth. Of the 519 to 533 acres of productive old growth forest (POG) proposed for harvest in Alternatives B, C and D, approximately 43 percent is considered to be highly productive or high-value old growth. In Alternative B, 70 percent of the harvest uses clearcut prescriptions. In Alternatives C and D, uneven-aged prescriptions call for 50 percent removal. Table Old Growth-4 displays the change in high volume POG by alternative.

Table Old Growth-4
Emerald Bay High Volume Old Growth Before and After Harvest

Alternative	Acres high volume POG	Percent of Project Area in high volume POG	Acres of harvest in high volume POG[1]	Percent of harvest in high volume POG
A	2,347	30%	0	0
B	2,347	30%	256	43%
C	2,347	30%	264	43%
D	2,347	30%	264	43%

[1]POG following harvest
Source: Forest Service GIS

Habitat Connectivity

The Tongass NF tends to be highly fragmented at the landscape scale due it's numerous islands and dramatic topographic relief. At the stand scale, the forest is also highly fragmented due to a diverse and fine-scale mosaic of forest and land types (USDA Forest Service 1997). The Forest Plan identified measures to maintain old-growth connectivity along the Cleveland Peninsula. This includes the medium OGR in the project area, as well as standards and guidelines such as those for beach/estuary and riparian buffers.

The project area was identified as a "pinchpoint" for some species moving along the Peninsula (DGC letter, 1/19/01). The Cleveland Peninsula is approximately five miles across between Emerald Bay and Spacious Bay. The portion of the project area that is available for timber harvest is approximately 0.75 miles at this point, leaving 4.25 miles in old-growth habitat reserves and other non-development LUDs. Most of the distance across at this point (85 percent) is outside the Timber Production LUD and would be maintained with its current stand structures.

Alternatives C and D propose silvicultural treatments that mimic natural processes, and would maintain the stands as old-growth but in a lower volume category. Implementation of the Plan standards and guidelines for habitat components such as snags and downed logs would maintain these components in the units. This, along with the residual trees, would maintain some level of connectivity. Alternative B includes clearcutting, which would not maintain all of these features. Implementation of the marten guidelines in these units would maintain some level of canopy cover, snags, and downed logs, all important components of old-growth. While the harvest under all alternatives would change the stands to a less-productive category, the stands are located outside of the Old-growth LUD, and effects on species viability are not expected. Where effects to movements could be possible, they will be discussed for the individual species affected. The current system of OGRs and the use of standards and guidelines would ensure a high likelihood that habitat connectivity would be maintained for all old-growth associated species.

Effects of Roads

Alternatives A and C do not propose any road building. Under Alternative B, 6.2 miles of road would be constructed. Under Alternative D, 3.8 miles of road would be constructed. Both roaded alternatives would construct 2.2 miles of road through the medium Old-growth Habitat Reserve (OGR). Portions of this section of the road would also pass through an estuary buffer and a bald eagle nest tree buffer. Forest Plan Standards and Guidelines allow for road construction through OGRs and estuary buffers if other alternatives are not feasible. The

isolated nature of the Emerald Bay project area precludes other means of roaded access. Roads constructed through the Old-growth Reserve as part of Alternative B and D would be built to standards that minimize impacts to resources. This would include narrow rights-of-way, outsloping, and log-stringer bridges (as opposed to culverts). Roads would be closed to motorized vehicles when harvest operations are complete.

The portion of the road within the OGR (Alternatives B and D) and its right-of-way would cover approximately 14 of the 5,259 acres of the OGR within the project area. Based on earlier analysis and GIS Volstrata information, the road and its right-of-way would remove approximately 5 of 3,913 acres of the POG within the OGR. The remaining 9 acres are non-forest. Field reviews of the proposed road location in the summer of 2003 found that the road location actually crosses through more medium and high volume old growth and is located closer to the creek than originally mapped (Reeck, J. pers. comm.) Assuming the worst-case scenario, that all 14 acres are high volume old growth, it would still be less than 1 percent of the POG within the OGR. However the construction of the road would remove trees and create a linear feature, with edge effects, through OGR.

The roads in Alternatives B and D would be in-use until the end of the timber sale. It is estimated that road building and harvest would occur over two to three seasons. They would not be open to public use during this time. Upon completion of the timber sale, the roads would be put into storage. This means the roads would be further outsloped, water barred, barriers put in place (rocks and root wads), seeded, and the bridges would be removed. It is expected that alder would become established on the roadbed within 10-20 years. Effects of the road on individual species (fragmentation, edge effects, accessibility to humans, etc.) are discussed in the Threatened, Endangered and Sensitive Species and Wildlife sections of this chapter. See Appendix C maps for the road location and forest types that it accesses.

Monitoring results across the Tongass in 2000 found that bridge removal was 100 percent effective in blocking vehicle traffic (Tongass Monitoring and Evaluation Report 2000). Later monitoring found that pit and mound or waterbars were about 50 percent effective for all vehicles. Vegetative cover blocked full-size vehicles but more than half of the closures surveyed showed use by non-highway vehicles (Tongass Monitoring and Evaluation Report 2002). Based on this monitoring, it would be expected that removal of the bridge at milepost 1.47 would be 100 percent effective at blocking traffic. The first mile and a half could receive some use by ATVs although it would be legally closed. However, because of the areas distance from population centers, and problems associated with access and unloading, use is expected to be very limited and alder should successfully close the road to motorized use within 10-20 years.

Cumulative Effects on Old-growth Habitats

Cumulative effects analysis was completed for both the project area and the surrounding Wildlife Analysis Area, WAA 1817. An analysis of cumulative effects includes "reasonably foreseeable future actions" (40 CFR 1508.7). The Emerald Bay timber sale is scheduled for sale in 2005. We do not anticipate another timber sale in the Emerald Bay project area for at least 50 years.

Table Old Growth-5 displays the amount of productive old-growth forest harvested to date within the project area, and gives an estimate of the productive old growth originally existing there. Comparing these two figures gives an indication of the cumulative effect (as a reduction) on the old-growth forest resource in the project area so far. Table Old Growth-4 displays the cumulative change (reduction) in project area productive old-growth forest, as a percentage of that existing in 1930. Included are both the amount of POG harvested to date (which is the same for all alternatives), and the amount remaining following additional harvest under each Emerald Bay action alternative. It should be noted that the figures displayed for both Alternatives C and D assume clearcut harvest methods (worst-case scenario). Since both of these alternatives propose uneven-aged prescriptions, the effects to POG will be less. The

areas proposed for group selection prescriptions will maintain up to 50 percent of the matrix forest between groups.

Table Old Growth-5
Acres of Productive Old Growth (POG) Forest in the Emerald Bay Project Area in 1930, 2003, and Estimated by Alternative for Post Project.

	Alternative			
	A	B[1]	C[2]	D[2]
1930 acres	5,271	5,271	5,271	5,271
2003 acres	5,257	5,257	5,257	5,257
Post Project Acres[3]	5,257	4,716	4,724	4,710
Change since 1930	-1%	-11%	-10%	-11%

[1]Alternative B is 70 percent clear-cut harvest.
[2]Alternatives C and D are 100 percent partial harvests.
[3]Post project acres subtracts all harvest unit acres and all road right-of-way acres
Source: Forest Service GIS

Table Old Growth-6 displays the percent of POG remaining in the WAA after implementation of the alternatives.

Table Old Growth-6
WAA 1817 Productive Old Growth After Harvest

Alternative	Acres POG remaining	Acres of Harvest POG	Percent of WAA 1817 in POG
A	35,336	0	55%
B	34,817	519	54%
C	34,803	533[1]	54%
D	34,803	533[1]	54%

[1] these acres will have legacy trees left but will not be in high volume POG following harvest
Source: FS GIS Vol Strata

Within the WAA there are no scheduled harvests planned on the FY03-12 Timber Sale Plan. The Emerald Bay Roads Analysis map shows a projected road system from south of Port Stewart and west to south of Vixen Inlet (VCUs 7180 and 7200), however, this is not on the 10-year Timber Sale Plan, is too far out in the future, and is too speculative to assess the effects.

Other activities planned on National Forest System land in the vicinity of the Emerald Bay project area are not expected to affect or be affected by activities associated with the Emerald Bay project and were discussed in the Introduction to this chapter.

Fisheries Resources

The following descriptions and analysis are summarized from the Emerald Bay planning record documents: Fish and Water Resource Report (1999) updated in 2003, and Soils and Water report for the Emerald Bay project area (1999). A related analysis of fisheries is contained in the Forest Plan, Chapter 3. Applicable fisheries and riparian direction is contained in the Forest Plan, Chapter 4 and Appendices D and J. Site-specific implementation requirements and mitigation measures are discussed in Chapter 2.

Affected Environment

Fish Species and Uses

Project area streams contain important anadromous and resident fish habitats (see Fish and Water Resource Report). The streams support three species of anadromous salmon (pink, chum, and coho), as well as resident coastal cutthroat trout, and Dolly Varden char. King salmon are present in the inlets and bays of the project area, but do not spawn in project area streams. Salmon, trout and char are important to the subsistence, sport and commercial fisheries of the region, and are a major food source for many wildlife species when present. Alaska Department of Fish and Game does not issue personal use permits for the fresh waters of the project area. Emerald Creek contributes to the commercial fisheries of Southeast Alaska.

Fish Habitat

Fish habitat is described by watershed, stream class, and process group (stream channel typing). Floodplains, the most important process group relative to fish habitat, are discussed in the Water section of this chapter. Watersheds are areas that collect and discharge runoff through a given point on a stream. The Emerald Bay project area includes two separate watersheds, Wasta (C72C) and Emerald Bay (C70A). Over 75 percent of the project area is located in the Emerald Bay watershed. There are less than 20 acres of lake habitat in the Emerald Bay project area. The 18-acre lake in the Birch Creek sub-basin of the Emerald Bay watershed has a 950-foot elevation and does not contain fish.

Fish habitat was analyzed at the watershed scale using estimates of fish habitat availability (miles of fish-bearing streams in a watershed) and capability (ability by a watershed to produce smolts). Estimates were compared against data collected for similar-sized watersheds across the Cleveland Peninsula (at least third-order and greater than 1 square mile). Emerald Bay fish habitat availability estimates were slightly above average. Potential capability to produce smolts was slightly above average for salmon, and slightly below average for Dolly Varden. The fish habitat is slightly above average when compared against similar watersheds across the Cleveland Peninsula landscape. On the Cleveland Peninsula, the majority of salmonid habitat and salmonid production occurs in the Vixen, Port Stewart, Black Bear, and Wasta watersheds.

The Emerald Bay watershed was divided into four sub-basins for sediment risk analysis (see Fish and Water Resource Report). The most sensitive resident salmonid habitat in the watershed is located in sub-basin S01 (upper Birch Creek) where four Class III tributaries join an unstable palustrian complex at the upper mainstem floodplain.

The Emerald Bay project area encompasses one sub-basin of the Wasta drainage. The single Wasta sub-basin located within the project area is part of a low elevation divide and is relatively flat. A small pond (less than 3 acres) and a narrow (5 foot bed-width) Class II stream drain this sub-basin.

There are 15.3 miles of streams in the project area, with 14.7 miles of streams in the Emerald Bay watershed (see Table Fisheries-1). Streams are shown on the unit cards as Class I, II, or III streams.

Table Fisheries-1
Number of Stream Miles by Stream Class in Emerald Bay Watershed

Class I	Class II	Class III	Class IV	Total
2.5	3.5	4.6	4.1	14.7

Source: Forest Service GIS

Existing Harvested Areas and Road Crossings

Timber harvest and roads are typically the forest management activities with the highest potential to adversely affect fisheries habitats. The Emerald Bay project area has had 14 acres of selective timber harvest in the past. The harvest occurred approximately 60 years ago at the mouth of Emerald Creek (harvest age was determined by increment boring). Primarily Sitka spruce was removed from the floodplain (FP4 channel-type) just above the estuary. Harvest did not extend past the confluence of Emerald and Birch Creeks. The majority of the western hemlock was left standing. During a reconnaissance in April 1998, large woody debris and pools were present in the channel, with several wood pieces spanning the creek and checking substrate. Along the streams where harvest occurred, numerous large (diameter equal to or greater than 20 inches breast height (DBH)) trees are growing along the steam. Many of the trees are hemlocks that are hundreds of years old that were left standing when the riparian area was selectively harvested. In addition to the hemlock and relatively large alder (14 inch DBH), Sitka spruce trees, which have regenerated naturally, are expressing dominance. Many of these spruce have DBHs in excess of 15 inches as well. To the untrained eye, the riparian corridor appears to be multi-aged old growth. Opportunities to enhance this stream reach were investigated and determined to be unnecessary due to the abundant supply of large living trees along the stream bank available for natural recruitment. There are also several down trees within the stream that are creating quality fish spawning and rearing habitat. The floodplain along the harvested section of Emerald Creek was determined to exist within the natural range of conditions found along streams that have not been harvested.

Environmental Consequences

Timber harvest activities have the potential to affect fisheries resources by altering fish habitat. Logging and associated road building can affect fisheries resources by changing the delivery of water, sediment, and input of large woody debris into the stream system. Changes of the input and transport of these components can adversely affect the capability of the stream habitat to produce fish. The closer the timber harvest activities are to a stream, the higher the risk of adversely affecting fish habitat.

Fish Habitat Protection Standards

The National Forest Management Act implementing regulations prohibit any activities near streams that would seriously and adversely affect fish habitat (36 CFR 219.27 (e)). In addition, the Tongass Timber Reform Act of 1990 requires a no-harvest buffer zone of at least 100 feet on each side of all Class I streams, and all Class II streams that flow directly into Class I streams (Section 103 (a)).

The Forest Plan Riparian Standards and Guidelines (S&Gs) incorporate this direction and provide additional protections. The Riparian S&Gs require no-harvest buffers along all Class I, II and III streams, based on stream process groups and a defined Riparian Management Area, and provide direction for management beyond the no-harvest zone to provide for a reasonable assurance of windfirmness. Riparian Standards and Guidelines were specifically developed through a collaborative effort involving lead watershed and fisheries scientists from Federal (management and research) and State (Alaska Dept. of Fish and Game; Alaska Dept. of Environmental Conservation) agencies. They are the measures established to avoid any additional impacts to aquatic resources from management activities and can only be modified through an approved, site-specific watershed analysis. The standards and guidelines and other

direction of the Forest Plan meet or exceed all of those recommendations by Anadromous Fish Habitat Assessment (AFHA), and include some additional protections. These standards and guidelines are sufficient to protect fish habitat and provide for sport and commercial fisheries and subsistence.

Finally, the Best Management Practices (BMPs), designed to ensure compliance with the Clean Water Act, help protect riparian habitat on Class IV streams not protected by buffer zones. In order to minimize the potential for adverse impacts on soil and water resources by management activities, BMPs are used to directly or indirectly protect water quality from non-point source pollution. This is typically done through site-specific prescriptions.

Results of the Fish and Water Resource Report mentioned previously were used in the design of harvest and the inclusion of additional mitigation measures. Areas where high risk was identified or indicated were avoided. If additional streams are found during project layout, the same standards and guidelines would be applied. Future monitoring would focus on the application and adequacy of buffer prescriptions.

A Management Indicator Species (MIS) monitoring site for resident salmonids was located and delineated on the ground in the Birch Creek watershed. Monitoring of this site began in July 2001 and will continue after timber harvest is complete. The formal consultation process for EFH will start when the USFS sends a copy of the revised EFH assessment and a Draft SEIS. Documentation of the consultation process will be included in the Final SEIS.

Use of mitigation measures serve to substantially minimize potential effects to the project area fisheries resource. Measurable direct, indirect or cumulative effects to fisheries resources are not anticipated due to the implementation of the Forest Plan Standards and Guides. The following discussions address the potential risk that unforeseen effects may still occur. It should be emphasized that this is only an indication of relative risk, not an estimate or expectation of adverse effects actually occurring.

Roads and Stream Crossings

Road construction and use often poses the greatest potential risk to riparian resources and fish habitat capabilities. Proposed road construction under Alternatives B and D requires crossing streams to access timber harvest units (see Table Fisheries-2). Roads can affect fish habitat through the introduction of fine sediment, increased landslide potential and re-routing of sediment-laden water. Road construction also has the potential to affect upstream fish passage through improper placement or sizing of culverts. Log stringer bridges would be installed to provide fish passage.

Alternative B has the greatest amount of proposed road at 6.2 miles. Alternative C has no proposed road and Alternative D proposes 3.8 miles of road. The road through the OGR in Alternatives B and D has been routed so as to minimize adverse impacts to fish habitat and number of crossings needed. The road would be designed to reduce the footprint on the land. All crossings would be log-stringer bridges, which would be removed at the end of the sale. Alternative D does not require a crossing at Birch Creek.

Table Fisheries-2
Emerald Bay Stream Crossings by Alternative

Alternative	A	B	C	D
Number of Crossings	0	12	0	7

Source: Forest Service GIS

Alternative D would require five fewer stream crossings than Alternative B. Risk to fisheries resources in Alternative D is less than Alternative B because no crossings are required at Birch

Creek or in the large Class III streams in the upper flood plain. All required crossings would utilize log-stringer bridges.

Effects of Alternative D would be slightly greater than those of Alternative C because of sediment. A minor amount of sediment may be introduced into watercourses from road building, stream crossings, and road traffic. Of the two roaded alternatives, D would likely have fewer effects based on the number of proposed stream crossings.

Of the three action alternatives, B is likely to have the most risk to fish habitat as a result of road construction. Alternative C would likely pose the least risk to fish habitat, while Alternative D would fall somewhere in between.

Timber Harvest

Removal of riparian vegetation through timber harvest can affect fish habitat and fish populations by increasing sediment inputs into streams, changing stream temperature and dissolved oxygen levels, changing the input of large woody debris, and altering the delivery of water to streams. Alternative B proposes 601 acres for harvest treatment: 396 acres of clear-cut and 205 acres of selection harvest. Alternative C proposes 620 acres for harvest treatment, all either group or single-tree selection. Alternative D proposes to harvest the same acreage as Alternative C, using the same silvicultural prescriptions.

Of the three action alternatives, B is likely to have the most risk to fish habitat as a result of timber harvest. Alternatives C and D pose nearly the same risk to fish habitat from timber harvest. The risk from Alternative D may be slightly higher due to the effects of the road right-of-way harvest.

There would be no riparian area harvest in units along Class I, II or III stream under any alternative. There is the possibility of loss of trees within riparian areas due to future windthrow; however, significant adverse effects to fish habitats or populations are not anticipated.

Timber harvest may remove riparian vegetation to the streambank along Class IV streams included in harvest units (see Table Fisheries-3). These are all non-fish streams, and water flows are often intermittent or ephemeral. While these streams have insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality and fish habitat, they inevitably do introduce some sediment.

Table Fisheries-3
Effects of Timber Harvest by Alternative (miles of unbuffered Class IV streams)

Alternatives	A	B	C	D
Unbuffered Class IV	0	2.9	3.3	3.3

Note: Differences between numbers displayed here and those displayed in the Draft EIS are due to additional field data collected subsequent to Draft EIS preparation.
Source: Forest Service GIS

BMPs are applied to these streams, and they may also receive additional protection in the form of full suspension over the stream, directional felling, or split yarding, based on the physical characteristics of the stream and the need to protect streambank integrity.

Essential Fish Habitat

Introduction

Essential Fish Habitat (EFH) is the water and substrate necessary for fish spawning, breeding, feeding, or growth to maturity. The marine EFH in Alaska includes estuarine and marine areas from tidally submerged habitat to the 200-mile exclusive economic zone (EEZ). The freshwater EFH includes streams, rivers, lakes, ponds, wetlands and other bodies of water currently and historically accessible to salmon. EFH for Pacific salmon recognizes six critical life history stages: (1) spawning and incubation of eggs, (2) juvenile rearing, (3) winter and summer rearing during freshwater residency, (4) juvenile migration between freshwater and estuarine rearing habitats, (5) marine residency of immature and maturing adults, and (6) adult spawning migration. Habitat requirements within these periods can differ significantly and any modification of the habitat within these periods can adversely affect EFH.

Assessment

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act states that all federal agencies must consult the National Marine Fisheries Service (NMFS) for actions or proposed actions that may adversely affect Essential Fish Habitat. The Act promotes the protection of EFH through review, assessment, and mitigation of activities that may adversely affect these habitats. On August 25, 2000 the Forest Service, Alaska Region, and NMFS came to an agreement of what this consultation entails. The Emerald Bay Draft EIS was completed and distributed on January 10, 2000 before the agreement was signed between the two agencies. Due to the date of the agreement, EFH consultation was not initiated during the Draft EIS phase for the Emerald Bay Timber Sale.

To comply with the EFH agreement, the Forest Service contacted NMFS on October 17, 2003 to explain the situation regarding the Emerald Bay Timber Sale appeal process. It was agreed that, the formal consultation process will start when the Forest Service sends a copy of the revised EFH assessment and a Draft SEIS. NMFS may then respond in writing to concur with the findings of the EFH assessment or to make conservation recommendations. The Forest Service must respond to any recommendations made by NMFS within 30 days. Documentation of the consultation process will be included in the Final SEIS.

The Emerald Bay Project Area is located on Cleveland Peninsula in the Ketchikan-Misty Fiord Ranger District of the Tongass NF. It includes about 14.7 miles of streams. Of the 14.7 miles of streams, approximately 2.5 miles are Class I streams that contain populations of coho, chum, and pink salmon.

In the action alternatives, Alternatives B and D would harvest timber using both conventional and helicopter yarding systems. Alternative B would harvest 32,749 CCF and construct 6.2 miles of new road. Alternative D would harvest 24,783 CCF and construct 3.8 miles of new road. All roads built under these alternatives would be closed after completion of timber harvest. Both alternatives would use a newly developed log transfer facility.

Alternative C would harvest 24,359 CCF of timber and use only helicopter yarding systems. No new road or log transfer facility construction is planned under this Alternative.

The Essential Fish Habitat within the project area is primarily fresh water, although there is a potential for affects on marine habitats resulting from use of the proposed Emerald Bay log transfer facility. Dive surveys were completed by the U.S. Fish and Wildlife Service on June 8, 2000. Divers followed a 100 meter transect at the proposed LTF location and documented both physical and biological characteristics of the site. The California sea cucumber (*Parastichopus californicus*) and hermit crab (*Pagurus spp*) both non-managed groundfish species were the dominant animal species throughout the 100 meter transect. The spiny scallop (*Chlamys hastata*) and rock sole (*Pleironectes bilineatus*) both managed species were present along the

transect near the 80 meter mark. It was noted by the divers that the area in front of the proposed LTF is characterized as having a high species diversity of the typical plant and animal species for SE Alaska. All alternatives for the Emerald Bay timber sale would utilize a barge loading facility that would minimize effects to the marine environment around the proposed LTF. Loading logs onto a barge would prevent them from being placed into marine waters and reduce accumulations of bark debris on the substrate in front of the LTF. Bark debris has been shown to smother natural substrates and likely reduce prey organisms for rock sole and other bottom fish.

Timber harvest near Class I streams and wetlands, may have an adverse effect on Essential Fish Habitat in the streams and lakes. These potential impacts include increased peak flows, increased sediment delivery and potential blockage of upstream movement of fish at road crossings. However, by following the standards and guidelines in the Forest Plan, the effects on freshwater EFH would be minimized for the following reasons.

1) All Class I streams within the project area would be protected by a no-harvest buffer of 100 feet or more in accordance with the Forest Plan and the Tongass Timber Reform Act (TTRA).

2) In areas where extensive windthrow has occurred in the past, buffer widths would be increased, and additional trees would be left standing to assure resistance to windthrow.

3) All Class II and Class III streams would be protected by no cut buffers. Class II streams would receive a no cut buffer of 100 feet or more and Class III streams would receive a windfirm no cut buffer to the slopebreak in accordance with the Forest Plan and the Tongass Timber Reform Act (TTRA). This minimizes the potential impact to downstream Essential Fish Habitat.

4) Best Management Practices (BMPs) would be implemented to protect water quality and aquatic habitat protection for all freshwater streams within the project area.

5) All Class I and II stream crossings associated with the proposed roads would have log stringer structures to provide fish passage.

Conclusions
The Forest Service believes that Emerald Bay Timber Sale may adversely affect Essential Fish Habitat. However, by implementing Forest Plan Standard and Guidelines and Best Management Practices, affects to Essential Fish Habitat would be minimized. Additional impacts to EFH are likely to occur only from unforeseen events. A copy of this revised EFH assessment and Emerald Bay Draft SEIS will be given to NMFS as stated in the agreement, and the Forest Service will continue the consultation process with the National Marine Fisheries Service.

Cumulative Effects
The area analyzed for cumulative effects includes the Wasta (C72C) and Emerald Bay (C70A) watersheds, which encompass all proposed activities. Use of the protection measures listed above serves to substantially minimize potential effects to the project area fisheries resource. Measurable cumulative effects to fisheries resources are not anticipated.

Reasonably Foreseeable Future Actions
An analysis of cumulative effects must also include "reasonably foreseeable future actions" (40 CFR 1508.7). For the Emerald Bay project action alternatives, harvest is scheduled to occur over the next 5 years. There are no other foreseeable actions within the analysis area.

Since the Emerald Bay sale occurs in distinct watersheds, separated by topographic features from any other sales on public or private land (with the exception of the small 65-year-old harvest near the beach), cumulative effects to the fisheries resource are expected to be negligible.

Heritage Resources

The Emerald Bay project area is located on the northwest portion of Cleveland Peninsula where considerable archaeological survey has been conducted. The surveys conducted for the Emerald Bay Timber Sale EIS, in conjunction with the surveys for the Yes Bay/Mink Bay Land Exchange and the Smugglers Cove Recreation Shelter and Trail and the Cleveland Peninsula EIS surveys have added significantly to our understanding of the chronology of human occupation and patterns of subsistence on the Cleveland Peninsula.

Affected Environment

The Cleveland Peninsula occupies an important place in the traditions of the Tlingit people. Port Stewart, which was called Ganax or "safe, sheltered bay" (Emmons, 1916) is considered important to the Ganxadi and Ganaxtedi clans who derived their names from this area. Consultation regarding potential cultural sites and the results of archeological surveys was accomplished with the Wrangell Cooperative Association. According to Goldschmidt and Haas (1946) who conducted interviews with Native people in an effort to determine traditional land-use patterns, it was determined that the Emerald Bay area was within the territory of the Kiks'adi people of the Stikine area and was likely utilized for seasonal subsistence activities.

During the pre-field work literature search and analysis, a single notation indicating cultural use of Emerald Bay was located in T.T. Waterman's 1926 report "Tlingit Geographical Names for Extreme Southeast Alaska." Waterman listed in his field notes a portage trail from Spacious Bay on the east coast of Cleveland Peninsula to Emerald Bay. This report also suggests that a portage route was used from Yes Bay to Santa Anna Inlet. Kiks'adi oral traditions may indicate that at least one early migration of the clan utilized a route crossing between Spacious Bay and Vixen Inlet (Feller, J. pers. comm..).

Field investigations were concentrated along the coastline and estuaries. An aerial reconnaissance of the interior areas between Spacious Bay and Emerald Bay indicates that there are a number of game trails which intersect and meander across the breadth of the peninsula (no project activities are proposed for the interior wetland areas). The topography from Emerald Bay to Spacious Bay gains up to 300 feet of elevation and is vegetated with dense berry bushes and a predominant overstory of hemlock along the drainages and higher elevations. The elevation and open muskeg environments are more consistent from Spacious Bay along the Wasta Lake and Creek drainage system to the vicinity of Vixen Point and Inlet. The assumption from these inspections is that a portage trail would be ephemeral and virtually indistinguishable from the many game trails currently present. A portage trail could have been followed to the Vixen Inlet vicinity as well as to Emerald Bay.

Archaeological surveys in Spacious Bay during 1996 and the Emerald Bay survey in 1998 failed to locate any camps or a specific trail that could be associated with a portage route. Despite intensive survey of the estuaries and the coastal areas with good shellfish concentrations, beaches to land boats, fresh water, and well-drained localities, no indications of long-term use were identified. One historic site, CRG-480, was identified and documented by the Emerald Bay survey. Additionally, the survey did identify 21 culturally modified trees (CMTs). The majority of these modifications were alcoves cut into the trees indicating fire-making activities associated with either recreational or subsistence activities. Four rectangular bark-stripped cedars are modifications that can be attributed to Native bark stripping activities. Thousands of hand-logged stumps were found throughout the area along the coast and estuary and for some distance inland from the coast, indicating extensive hand-logging activities during the 1900s. It is possible that these logging activities may have obliterated any cultural sites that

existed in the locality. Consultation with the SHPO however, found none of these sites eligible for the National Register.

Environmental Consequences

In all alternatives, all harvest units and all proposed road construction above 200 feet elevation would fall in low-sensitivity areas for heritage resources (high elevations and steep slopes), as defined in the 2002 revised programmatic agreement (Agreement #02MU11101-076) between the Forest Service Alaska Region, Alaska State Historic Preservation Office, and the Advisory Council on Historic Preservation. The archaeological analysis from literature search and the subsequent field survey in areas having the highest probability for locating cultural resource sites has located no significant historic or prehistoric properties. It is expected that there would be no direct, indirect, or cumulative effects on any significant cultural resource sites from the activities planned here. The area considered for cumulative effects was the project area, VCU 7210. Post-construction monitoring of a sample of roads and units would be implemented to further evaluate the sensitivity model.

The State Historic Preservation Officer has been consulted, in accordance with Section 106 of the NHPA and 36 CFR Part 800, and concurred that no National Register eligible sites would be affected by the proposed activities. No effects on known significant cultural resources are anticipated.

Marine Environment, Log Transfer Sites and Related Facilities

Affected Environment

Marine Environment

Southeast Alaska's coastline consists of approximately 30,000 miles of tidal shoreline, roughly 60 percent of the total Alaskan coast. Within this region, a great diversity of habitats comprises Southeast Alaska's complex estuary and tidal environments.

The intertidal and subtidal marine environments are subject to effects from log transfer and storage facilities; these are the points of concentrated activity associated with marine transportation of logs. Deep bays or coastlines along straits or channels are preferred sites for log transfer facilities (LTFs), log storage areas, camp settlements, and anchorages. These areas are preferred because the deeper water and stronger currents flush out bark and debris that may enter the water, and therefore have less impact on marine life. Other marine areas are not addressed here because the timber harvest activities of this project are not expected to affect these areas.

The shallow marine waters and associated mud flats and estuaries found in the protected coves and bays of the Emerald Bay project area provide habitat for some important species such as Dungeness crab, sea cucumber and juvenile salmon. They are part of a complex and dynamic ecosystem that also includes shrimp, flatfish, marine worms, echinoderms, sponges, sea anemones, shellfish, plankton, marine algae, and other organisms.

The transportation of harvested timber on the project area requires that the logs be trucked or flown to the ocean, transferred to barges at an LTF, and towed to a sortyard for sorting. They are then moved to processing sites such as the sawmills at Ketchikan or Wrangell.

There is one potential LTF within the project area.

Table Marine-1
Proposed LTFs Associated with the Project Area

Location	Number	Latitude	Longitude
Emerald Bay	1	55 15 02 N	132 13 46 W

Source: Forest Service, J. Oien 1998

Log Transfer Methods

Two log transfer methods were considered in this analysis: (1) land-to-barge type facility, and (2) helicopter-to-water or barge facility.

Land-to-barge
The land-to-barge transfer system requires a deep-water bulkhead for the barge mooring facility. A minimum of 25 feet of water at low tide is required for barge operations. Logs are loaded directly onto the barge by use of a loader. Barges can also load logs floating in the water with on-board cranes.

Helicopter-to-barge
The helicopter transfer of logs to a barge consists of moving logs from the harvest area directly onto a barge.

Each LTF requires a log transfer area, a small airplane and boat dock, and an equipment off-loading ramp. These facilities are generally located within close proximity of the LTF to reduce costs and retain impacts within a localized area.

LTF Sites Considered in Detail

The area is limited in the number of sites available for consideration due to the exposure to weather and outside waters. A total of two LTF sites were considered for this project. One site was eliminated from further consideration for terrain or environmental reasons. The other site would be developed as a land-to-barge site. Due to the single entry and lower volume of timber accessible to this LTF, the barge facility would be constructed to have a lower-than-normal impact on the marine environment. This will limit its use at lower tides and would require the use of smaller barges for the loading of logs. Emerald Bay LTF site #8 is proposed for log transfer of timber from the Emerald Creek drainage and the surrounding areas.

Initial reconnaissance of potential LTF sites was done in 1982 in accordance with the Alaska Timber Task Force Siting Guidelines for LTFs. Additional reconnaissance was done in 1998 and 1999 to ensure that the potential sites met the ATTF Siting Guidelines. An underwater survey of the marine habitat at the potential site was completed during the summer of 2000. With this information the design of the land-to-barge log transfer facility has been completed for permit application.

Additional information and analysis can be found in the Evaluation of Log Transfer Facilities. LTFs were selected using the Alaska Timber Task Force Siting Guidelines and Section 404(b)(1) of the Clean Water Act to mitigate the effects of LTFs on other resources and ecosystems.

Logging Camps

Float Camps

The number and locations of float campsites would depend upon the number of logging and road construction contractors engaged in implementing the project. Additionally, camp configuration and type (such as barge or log floats) would influence the location. The operator will obtain required State and Federal permits for camps.

Land Camps

The contractor/operator will be responsible for obtaining appropriate permits for camps. Solid waste disposal would not be allowed on National Forest System lands. There are adequate upland areas for land camps. There would be no land camps within the OGR. At most, one low-occupancy camp is anticipated. Several contractors may share this camp.

Environmental Consequences

Log Transfer Facilities

Land to Barge LTFs

Barge LTFs probably have less effect on the marine environment than other LTFs, since logs are not rafted directly in the water; however, conclusive studies are not available for comparison. The rock bulkhead associated with the facility would be longer and slightly wider at the seaward end. The effects vary with each site. Bark and debris would accumulate only in a small area around the extreme seaward end of the facility. Contract provisions would be set in place to ensure contractor is avoiding these accumulations.

Helicopter-to-Barge LTF

Helicopter to a barge LTF probably has even less effect on the marine environment than land to barge LTFs. Helicopter-to-barge LTFs minimize bark deposition and eliminate embankment in the marine environment.

Effects on Marine Benthic Habitat

Alternatives B and D propose utilization of one land-to-barge transfer facility to transfer logs from trucks to water. The lift off system may be either a single or double A-frame. Bulkhead

construction ranges in direct impact to the intertidal area from .1 to .25 acres. Alternative C proposes helicopter transport of logs from the harvest area directly to a barge. This method eliminates the need for truck haul and road development. All accumulated debris on the barge would be flown back to the harvest units. Table Marine-2 displays the construction costs associated with each LTF.

Table Marine-2
Construction Costs Associated with Proposed LTF

LTF	Number	Transfer Method	Transfer Equipment Cost[1]	Site Development Cost
Emerald Bay	1	Barge Bulkhead	0	$80,000

[1]Transfer equipment costs are not included in cost of transportation system development costs.
Source: Forest Service, J. Oien 1998.

During the transfer of logs from land to a barge, a small amount of bark may be deposited on the ocean bottom. If the bark accumulates on the bottom, it can diminish habitat for bottom-dwelling crustaceans and mollusks, as well as hamper underwater vegetation used as food and rearing sites for fish and other organisms. The LTF has been designed to maximize the flushing of suspended bark away from the LTF area to the open sea before it can accumulate on the bottom. The timber sale contact would include provisions to make operator responsible for not allowing bark to enter the water.

Marine benthic habitat impacts are expected to be as follows:

- Structural Embankment: estimated 0.23 acres affected per site
- Site Bark Deposition: less than 0.0 acre /site

The marine benthic environmental impacts are displayed in Table Marine-3.

Table Marine-3
Estimated Marine Benthic Impacts (Acres) by Alternative

Alternative	A	B	C	D
Affected by Structural Embankment	0	0.23	0	0.23
Affected by Bark	0	0	0	0

Source: Forest Service, J. Oien 1998.

All LTF types occupy approximately the same amount of bottom area but in different configurations. For instance, the low-angle ramp system with a 10 percent grade extends approximately 250 feet out into the water on a moderately sloped beach. This system is thus long and narrow. The land-to-barge systems proposed for this project use more shoreline and do not protrude out into the water as much as the low-angle ramp system.

Two publications describe some of the general effects of LTFs and log storage on the marine benthic habitat. Sedell and Duval (1985) summarize the information available on the effects log transport and storage has on marine resources and fisheries. Faris and Vaughn (1985) examined log transportation and log storage in Southeast Alaska. Detailed discussion of these can be found in the planning record.

The Alaska Timber Task Force Siting Guidelines for LTFs attempt to mitigate the potential effects of bark dispersal and toxicity by: (1) locating LTFs in areas having the least productive intertidal and subtidal zones to avoid degradation of marine habitat, (2) avoiding sensitive

habitats, (3) avoiding shallow water, and (4) providing that LTFs should be located along or adjacent to straits, channels, or deep bays where currents are strong enough to disperse sunken or floating wood debris. Currently, all active LTFs receive a yearly underwater diving and sampling transect as required by the EPA.

Both the helicopter-to-barge LTF proposed for Alternative C and the land-to-barge design proposed for Alternatives B and C would meet the siting guidelines outlined above. The area around Emerald Bay contains a high diversity of intertidal plants and animals. The proposed LTF was located at the best potential site for minimizing impacts and a barge LTF would further reduce impacts.

Of the three action alternatives, B and D are likely to have the most risk to marine benthic habitat as a result of LTF construction. The construction of a land-to-barge LTF is designed to reduce the impact. Alternative C would pose less risk to marine benthic habitat than both B and D, as it does not require construction of an LTF. There is a small risk of bark deposition occurring from helicopter transfer of logs to barge. This would be minimized through timber sale contract provisions.

Effects on Juvenile Salmon

Juvenile pink and chum salmon that spend several months, immediately after out-migration, in protected bays and coves would be more likely to be affected by log transfer activities. These small fish are highly mobile as they feed on marine invertebrates. Some of their preferred food items live on the bottom surface. Bark accumulation and the area under the embankment of a standard bulkhead eliminates a small portion of the habitat of those food items but is unlikely to cause measurable adverse consequences.

Effects of LTF on Commercial Fisheries

There is no formal documentation that LTF structures or activities associated with their use conflict with commercial fishing near the facility. If a facility were located in a small bay or cove, it is possible that there could be some difficulty maneuvering around moored barges to get to favorite fishing sites. No adverse consequences on commercial fishing, or subsistence use are anticipated as the result of LTF location. No adverse consequences to other marine resources such as Dungeness crab, sea cucumber, shrimp, flatfish, marine worms, echinoderms, sponges, sea anemones, shellfish, plankton, marine algae, and other organisms are anticipated.

Because none of these species are listed as threatened, endangered or sensitive, the Forest Plan provides no specific guidelines for management activities affecting them, but both types of LTFs, along with included contractual provisions are intended to further reduce the possibility of adverse impacts.

Effects of Logging Camp on Marine Resources

Camps associated with an LTF site can cause additional use of fisheries and marine sources. There are no data currently available on the amount of additional use occurring at various camp locations in the study area. The competition for resources at or near logging camp locations would probably increase. There is currently little or no information to indicate that resource allocation problems have occurred as the result of a logging camp. The Board of Fisheries and Game for the Alaska Department of Fish and Game (ADF&G) can control the amount of harvest by setting bag limits, shortening season lengths, or by instituting a complete closure of a fishery. If resource problems arise because of increased resource pressure due to a logging camp, the Forest Service would aid the ADF&G in attempting to resolve the problem. However, it is unlikely that utilization would progress far enough to cause adverse consequences on the fisheries or marine resources.

Of the three action alternatives, B and D are likely to have the most risk to fisheries habitat and marine resources as a result of LTF construction and camps. All three action alternatives present a slight risk of increased recreational fishing by logging camp residents. Designating offsite or inland locations would further reduce the impact from camps.

Wildlife

From a wildlife perspective, there are two types of effects associated with an LTF and camp. First, there is the potential loss of habitat due to clearing for the LTF and associated facilities. The amount of habitat lost is relatively minor. Camp facilities should be located outside the OGR. The second type of effect is disturbance as a result of increased human activity associated with the LTF. The overall effects of disturbance of wildlife use patterns are generally minor. Most wildlife species adapt to increased human activity but would be affected by increased hunting, and increased bear-human encounters.

Of the three action alternatives, B and D are likely to have the most risk to wildlife habitat as a result of LTF construction and roads. Alternatives B and D propose road construction within an eagle nest protection area as well as an estuary fringe and will require a variance from the U.S. Fish and Wildlife service. Log sort yards would not occur in the OGR and logs would be staged outside of the OGR while waiting transfer to the barge LTF. Alternative C would most likely require timing of helicopter harvest within the eagle nest protection area. All three action alternatives present a slight risk of increased recreational hunting by logging camp residents.

Visual Resources

The large size, linear bold shape, and saltwater location of LTFs generally dominate the landscape when viewed within the foreground distance (less than 1/2 mile). Their relatively low profile, however, helps mitigate the negative visual impacts when viewed from the middle ground (1/2 mile to 5 miles). A bulkhead type LTF would be built in Alternatives B and D. It would consist of a 30-foot wide pier built out a little over 100 feet from the tree line into the intertidal zone. The pier consists of a vertical log bulkhead on all three sides of the pier. Rock would be backfilled behind the logs. The height of the end of the pier at the lowest tides would be about 25 feet. This pier would extend out from an LTF operating area that would be cleared and leveled back from the high-water mark. The dimensions of this area would be about 150 feet wide by 50-75 feet deep. The operating site slopes up from the shore at about 20 percent grade. Hence the rock wall at the back of the operating area would range from 5 to 20 feet in height.

Though this facility may not dominate the view from the middle of Ernest Sound (about 2 ½ miles away), it would be clearly evident and would not meet the VQO of retention in the Old Growth LUD. From the middle of Ernest Sound it would probably meet a VQO of partial retention. An LTF is one of the facilities which an exception to the designated VQO of retention can be made on an individual basis.

The LTF and operating site would be decommissioned after harvest operations are completed. The bulkhead pier would be totally removed, with the rock fill spread on the operating area to approximately re-establish the original contours of the site. The rock would be covered with overburden and the area would be planted with a mix of trees of similar species to those which covered the site. With these measures it would take 50 to 60 years to establish enough forested texture for the area to attain a VQO of retention.

A road leading to the LTF would also be built in Alternatives B and D. The potential visual impact of the road accessing the LTF would be mitigated by aligning it to be screened by a buffer of trees, and paralleling slope contours as much as possible to avoid leaving a visible notch created by the right-of-way (ROW) clearing. This would reduce the impact and this segment of road would meet the VQO of retention. Other roads in Alternatives B and D would not be seen from Ernest Sound or Vixen Inlet.

No LTF, operating site, or roads would be built in Alternative C.

There would be no visual impact from the logging camp that would be built in Alternatives B, C, or D since it would not be built in the Old Growth LUD. The camp would be located in the Timber Production LUD, well away from saltwater and at the lower elevations above Emerald Creek. This facility would meet and exceed the VQO of maximum modification associated with the Timber Production LUD.

Long-term Accessibility
The short-term effects of developing LTFs in the intertidal area can be compared to the value of long-term accessibility for timber management in the area. It is assumed that other resources would have similar management opportunities with or without access to the uplands from saltwater (by an LTF). Table Marine-4 compares the number of acres potentially affected by each LTF to the number of acres of suitable timber harvest for each location. Short-term use of 0.23 acres of estuarine habitat, all of which occurs in large estuaries, would provide access to 957 acres of land suitable for timber production. This roughly equates to 10-15 million board feet available to help meet the goals of the Tongass timber sale program.

Table Marine-4
Comparison of Short-term Impact on the Estuarine System to Long-term Harvest (Year 2000 to 2006)

LTF Name	VCU Served by LTF	Estimated Acres of Impact on Estuarine System	Acres of Potential Harvest
Emerald Bay	7210	0.23	957

Source: Forest Service, J. Oien 1998

Of the three action alternatives, B and D are likely to have the most risk to long-term accessibility. The land-to-barge LTF design is intended to minimize this impact.

Cumulative Effects
Activities associated with the Emerald Bay Timber Sale should be completed by 2009. There are no future entries planned within the project area within the next 50 years. No effects associated with future activities planned within the vicinity of the project are expected. The area considered for cumulative effects is the marine environment within 1 mile of the LTF. Future projects are discussed in the introduction to this chapter.

Reasonably Foreseeable Future Actions
An analysis of cumulative effects must also include "reasonably foreseeable future actions" (40 CFR 1508.7). For the Emerald Bay project action alternatives, harvest is scheduled to occur by 2008.

Other activities planned on National Forest System land in the vicinity of the Emerald Bay project area are not expected to affect or be affected by the Emerald Bay project. These are discussed in the Introduction of this chapter.

Mitigation and Monitoring
Forest-wide BMPs in addition to low-impact roading and LTF facilities are expected to reduce impacts on Marine Benthic Habitat. Forest-wide BMP monitoring would be performed. Specific mitigations and monitoring are discussed in the unit and road cards. Timber sale contract provisions designed to prohibit bark deposition in salt water should also help to reduce impacts.

Recreation

The Tongass recreation and roadless area resources are discussed in considerable detail in the Forest Plan FEIS, Chapter 3. Recreation resources are also discussed in the Scenic and Recreation Resources Report for the Emerald Bay project (1999).

Affected Environment

Recreation Opportunity Spectrum

All recreation occurring in the project area is land based and only accessible by boat or float-plane. The only logical saltwater-based access point is at the Emerald Creek estuary. At low tide there is a small sloping gravel beach to the left of the estuary. It appears this cove may offer suitable anchorage except in strong north winds. There are no developed recreation sites at Emerald Bay or nearby. Although there are no formal records of recreation use within the project area, recreational use may occur along the shorelines of Emerald Bay and Emerald Creek in the form of fishing and boating. Upland recreation may include hunting and hiking in the alpine areas south and west of Emerald Bay.

Inventory of the recreation resource is accomplished by the Recreation Opportunity Spectrum (ROS). Six recreation experience settings define varying scales of human interaction levels and visitors' expectations, from Primitive to Urban. This range reflects levels of current and past human management activities. All the acreage in the project area is classified as Primitive - a setting that has never been altered by any resource utilization.

Recreation places are geographical areas of small to moderate size, which have one to several features that are particularly attractive to people engaging in recreation activities and receive recurring use. These features may be beaches, streamside or roadside areas, trail corridors, hunting areas, camping and picnic areas, anchorages, or other features. The project area currently has no identified recreation places.

Roadless Area

The entire 7,845 acre project area is within the 190,230 acre Cleveland Roadless Area #528. This roadless area is characterized by rugged terrain except for the uplands where the topography is flat wetlands and muskeg. The major scenic features are the diverse alpine terrain and small lakes. The area may have occasional minor use by local residents for recreation and subsistence activities. The project area's roadless character has been unaltered by human activity, its natural integrity is intact, and opportunities for solitude are excellent. The same is true for the southern portion of the roadless area, the area considered by most to be "the Cleveland Peninsula." The southern portion of this roadless area receives local resident use for subsistence and recreation activities, and is highly valued for its unmanaged character.

Environmental Consequences

Direct, Indirect and Cumulative Effects

There are no expected direct, indirect, or cumulative effects on recreation associated with activities proposed in the alternatives. The area considered for cumulative effects is the project area. The project area receives little recreational use due to the remoteness and difficult access of the area. The road would be closed to public use during the life of the timber sale, and the road and LTF would be physically closed to motorized vehicle use upon completion of the timber sale. Increased recreational use would be minimal and limited to occasional foot traffic on the closed road, however hiking the closed road would become more difficult with time, as the roadbed would grow in with red alder (North, M. pers. comm.).

Recreational activities along the shoreline may include fishing and boating. There is a possibility that hunting occurs in the mountainous terrain of the project area. None of these activities would be adversely affected by implementation of any action alternatives.

Reasonably Foreseeable Future Actions

For the Emerald Bay project action alternatives, the sale would be offered in 2005. No reasonably foreseeable future actions adjacent to the Emerald Bay project are scheduled to occur after that time. Other harvest planned on National Forest System land to the north of the Emerald Bay project is not expected to affect or be affected by the Emerald Bay project. These projects are not in Cleveland Roadless Area 528 and are discussed in the Introduction to this chapter.

Scenery

The following discussions and analysis are based on and summarized from the Scenic and Recreation Resources Report for the Emerald Bay project (1999). The scenic resources of the Tongass are also discussed in the Forest Plan.

Affected Environment

Visual Character of the Project Area

The project area is part of the Coastal Hills character type. This character type is one of six described for the Tongass NF. These are large geographical areas that each has some general distinguishing visual characteristics. Broad rounded or blocky ridges or peaks characterize the Coastal Hill type with elevations ranging on average between 2000 and 3000 feet.

The landscape of this project area is typical of the Coastal Hills character type. The scenery of the Emerald Bay project area is primarily viewed from Ernest Sound, a major waterway utilized by the Alaska State ferry system, barge and ship traffic, small cruise ships, and numerous pleasure craft. Ernest Sound is oriented in a southwest to northeast direction with the project area to the east of this channel. A steep-faced blocky ridge rising from saltwater to elevations of 800 feet at the northern end to almost 2,600 feet just above the mouth of Emerald Bay characterizes the northern two-thirds of the project area. This steep-faced ridge rises in a series of steps from north to south, culminating in the 2,600 foot peak which marks the most prominent landform in the project area. This sequence forms a bluff-like appearance. The southern and eastern portions of the project area south of Emerald Creek and at the head of the creek are characterized by broad, gentler-sloped, rolling terrain. The visible portions of this inland ridge where some of the proposed harvest is located are framed and accentuated by a noticeable gab created by the Emerald Creek drainage cutting through the terrain described above. This inland ridge top has visible alpine and open muskeg areas while dense forests cover the north-facing slopes.

Forest Plan Priority Travel Routes & Use Areas and Their Viewsheds

For planning and analysis, the scenic resource is described by viewsheds. A viewshed is an area of land visible from a specific use area or travel route. The Forest Plan identifies specific priority use areas and travel routes from which the scenic resource is to be specifically managed. There are two priority use areas in the vicinity of the Emerald Bay project area. Spacious Bay, which is on the eased side (Behm Canal) of the Cleveland Peninsula, sits directly east of the project area. Since terrain features clearly block any view of any part of the project area from Spacious Bay this use area will not be further addressed in this analysis. Vixen Inlet is just south of the project area on the west side (Ernest Sound) of the Cleveland Peninsula. One priority travel route, the Alaska Marine Highway ferry route through Ernest Sound, passes directly adjacent to the project area. This ferry route is an alternate, seldom used route that is between Ketchikan and Wrangell.

The viewshed of the project area as seen from the Ernest Sound ferry route, described above, includes the area north of Emerald Bay; a steep-faced ridge rising from about 800 feet elevation to over 2,500 feet elevation. South of the bay the landscape changes to very gently sloping terrain that features a broad, gently rounded knob reaching just over 1,000 feet elevation. At the head of Emerald Creek drainage the terrain has less relief and a gently sloped ridge that is partially visible between the steep escarpment to the north and the gentle knob to the south.

From Vixen Inlet, looking to the north, the south side of the above-mentioned broad rounded knob is visible. This side of the knob is not in the project area. Just to the east of this knob a portion of the ridge that rises above the head of Emerald Creek is visible.

Non-Priority Travel Routes and Viewsheds

The Forest Plan does not recognize small aircraft routes or commercial jet routes as priority travel routes. However in a project level analysis such routes can be identified and the impacts of a proposed action assessed. This project area is on a small aircraft route between Ketchikan and Wrangell. Aerial views of the project area from small aircraft are usually viewed form a 1,500 foot altitude. Emerald Bay is the northwestern terminus of a noticeable terrain feature; a mountainous escarpment connecting Spacious Bay on West Behm Canal to Emerald Bay. This visible and dominating physical feature marks a change in landscape types, from open, low-elevation muskets interspersed wit a few hills to a large, massive block of mountains with large areas of alpine meadows at the 1,500 to 2,500 foot elevation. Both commercial and private aircraft follow this natural terrain feature mostly due to safety.

Existing Visual Condition of Viewsheds

For the most part the visual condition of the project area is considered Type I; it is undisturbed where predominantly only ecological changes have taken place. A person on the beach around Emerald Cove would notice some indications of small-scale hand logging mainly along the creek bottom and A-frame beach logging, which occurred in the early 1900s. However, from the Ernest Sound boat route almost all of the viewshed identified above is in a Type I, or natural unaltered condition. This is a result of full regeneration of the early 1900s harvest area to a near-mature height, color, and texture.

Forest Plan Visual Quality Objectives

The Forest Plan provides specific visual management direction for the National Forest System Lands within the project area. The project area is allocated to tow Land Use Designations. Most of the project area, including most of the slopes along Ernest Sound, is allocated to Old Growth. The remainder of the project area, primarily an interior valley that extends inland from the upper reaches of Emerald Creek, is allocated to Timber Production. The visual quality objective (VQO) in an Old Growth LUD is retention in all portions of a viewshed (foreground, middleground, and background). Management activities, such as timber harvest and associated developments, should not be evident from travel routes or use areas. In a Timber Production LUD the visual quality objectives are modification in the foreground portion of the seen area and maximum modification in the middleground and background portions of the seen area. To meet a modification VQO an activity can dominate the natural characteristic landscape but its design should borrow significantly from natural forms, lines, and colors of the natural landscape. To meet maximum modification VQO activities can significantly dominate the natural landscape, however, the activity should be designed to appear to borrow from natural forms, lines, and colors, at least from a background viewing distance.

Environmental Consequences

The effects discussion centers on the viewsheds just described. All other areas are considered unseen from saltwater. See descriptions of alternatives in Chapter 2 regarding unit prescriptions and percent crown cover retained.

Effects by Viewshed

Priority Travel Route - Alaska Marine Highway Ferry Route - Ernest Sound
As a result of Alternative A, the no-action alternative, this viewshed would remain in a Type I or essentially unaltered condition.

Most harvest in Alternative B would be clearcut. The clearcut units are back in the interior drainages that are hidden from view fro Ernest Sound. Only unit 12 is potentially visible fro Ernest Sound, however most of this unit is prescribed for single-tree selection where about 50 percent of the stand would be retained. Given the moderate slopes and the obliqueness of portions of the unit, this harvest would not likely be visible and would exceed the adopted VQO of maximum modification. The impacts of this harvest would probably meet a VQO of retention.

Alternatives C and D harvest units through single-tree selection and group selection with about 40 to 50 percent of the stand retained. These alternatives would exceed the VQO of maximum modification and come close to meeting the VQO of retention as seen from Ernest Sound. The resulting viewshed from Ernest Sound would be in a Type II or naturally appearing condition.

Vixen Inlet

As a result of Alternative A, the no-action alternative, this viewshed would remain in a Type I or essentially unaltered condition.

A small portion of the slopes where unit 12 would be located is visible in the middleground from Vixen Inlet. However, in all action alternatives the harvest in this unit would not be evident because 40 to 50 percent of the stand would be retained. These alternatives would exceed the adopted VQO of maximum modification and would come close to meeting the VQO of retention. The resulting viewshed from Ernest Sound would be in a Type II or naturally appearing condition.

Non-Priority Travel Route Viewshed - Ketchikan-Wrangell Aerial Flight Path

All of the Emerald Bay harvest units would be visible from the air. Depending on aircraft flight altitudes and direction, these units would be in either a foreground or middleground viewing distance, and noticeable by air travelers. Although the majority of these units would be harvested by alternative harvest methods, clearcut units in Alternative B would create openings that would dominate the landscape. From aerial viewpoints this harvest would meet the VQO of maximum modification that applies to unseen land or land seen from a non-priority travel route. The single-tree selection and group selection harvest in Alternatives C and D may be evident in a few places from low altitude flights, but would probably not be evident from an altitude of several miles. In any case, these alternatives would meet the VQO of partial retention.

Cumulative Effects

The intent of Alternative B would be to harvest the remaining suitable timber in the interior valley over a 100-year rotation. Therefore, overtime, from the air this valley would change from an old-growth textured appearance to a patchwork of different textured stands resulting from the mix of stand age-classes. From the water viewpoints at least 2-3 miles away the slopes that are seen in this interior valley would continue to have close to a near natural appearance as the residual trees in the original partial cuts are harvested through the rotation. Harvest areas and edges visible to the Ernest Sound and Vixen Inlet viewshed would be designed to reflect nearby landform shapes. The impact created by the openings of subsequent harvest in visible stands would soften as the stands reforest. Ultimately, the openings would resemble natural occurrences from all points of view.

The intent of Alternatives C and D is to continue to harvest trees through single-tree selection and group selection with entries every 50 to 100 years. This would maintain the landscape in a naturally appearing, to nearly unaltered condition from the perspective of any view point.

Reasonably Foreseeable Future Actions

An analysis of cumulative effects must also include "reasonably foreseeable future actions" (40 CFR 1508.7). For the Emerald Bay project action alternatives, the sale would be offered in 2005.

Other projects planned on National Forest System land to the north of the Emerald Bay project are not expected to affect the viewsheds of the Emerald Bay project area. These are discussed in the Introduction to this chapter.

Cleveland Roadless Area

Introduction

Roadless areas are components of National Forest System lands that are undeveloped. These lands do not have improved roads maintained for motorized travel intended for highway use. These areas do not have extensive timber harvest or other developments. The important values and characteristics of roadless areas are becoming nationally scarce as some roadless areas become developed. The undisturbed landscapes of roadless areas provide habitat for plants, birds, fish and wildlife, clean drinking water, a place to recreate away from roads and development, and opportunities to study natural ecosystems. Roadless Areas were originally identified during the Roadless Area Review and Evaluation studies (RARE and RARE II) done in the 1970s. These studies identified areas that would meet the minimum criteria for inclusion in the National Wilderness Preservation System. During the 1989 roadless evaluation effort, the Cleveland Roadless Area was ranked at 23 points out of 28 possible points under the Wilderness Attribute Rating System (WARS). This rating was re-evaluated and was given a score of 25 in the Tongass Land Management Plan Revision Final Supplemental Environmental Impact Statement for Roadless Area Evaluation and Wilderness Reommendations (2003 SEIS). This score is more reflective of the large size of the area and its ability to absorb the various developments and activities. The median WARS score for Tongass Roadless Areas is 21and the Cleveland Area ranks 12th from the highest among the 109 Tongass Roadless Areas.

Forest Plan Analysis

During Forest Plan revision, all National Forest System lands, including unroaded areas, were included in that analysis. The previously identified Roadless Areas were re-examined to determine their land use designation (LUD). About 90 percent of the Roadless Areas in the Tongass NF were included in non-development LUDs such as remote recreation or semi-remote recreation. The other ten percent were assigned to development LUDs that allow timber harvest or road construction. In the 2003 Record of Decision for the Roadless Area Evaluation for Wilderness Recommendations no roadless areas were recommended for wilderness designation. Therefore, the LUD classifications of the 1997 Forest Plan Revision guide the management of the Cleveland Roadless Area. (See Table Roadless-1)

Affected Environment

Roadless Areas

Cleveland Roadless Area # 528

For a complete description of the Cleveland Roadless Area (#528) refer to The Tongass Land Management Plan Revision Final Supplemental Environmental Impact Statement for Roadless Area Evaluation and Wilderness Recommendations (2003 Supplemental EIS). The following description is summarized from the Forest Plan SEIS Appendix C2-536 to C2-543.

The Cleveland Roadless Area is located on the southern end of the Cleveland Peninsula on the mainland. The city of Ketchikan is located approximately 15 miles southeast of the area. The city of Thorne Bay is located about 10 miles to the west across Clarence Strait. Ketchikan is on the Alaska Marine Highway and has regularly scheduled air service. Access to the Cleveland is by boat or floatplane through the major bays. This part of the peninsula is the major land area between Revillagigedo (Revilla) Island and Prince of Wales Island. A trail that extends from Meyers Chuck provides access to some of the area. Access into the interior part of the Cleveland peninsula is by foot or helicopter. There are no places suitable for landing wheeled airplanes.

The Emerald Bay project area lies entirely within the 190,000 acre Cleveland Roadless Area. A portion of the Cleveland Roadless Area that the Emerald Bay Project Area lies within is

allocated as a timber production LUD. This LUD constitutes approximately 33% of the project area. The other LUD within in the project area is Old-growth Habitat, which comprises approximately 67% of the project area. The following table displays the various LUDs designated for the Cleveland Roadless Area as well as the portions of those LUDs within the Emerald Bay Project Area.

Table Roadless-1
Land Use Designations in the Cleveland Roadless Area

Land Use Designation	Area within Cleveland Roadless Area #528	Area within the Emerald Bay Project Area
	Developed Land Use Designation	
Timber Production	63,329 Acres	2,586 Acres (33% of project area)
Modified Landscape	13,989 Acres	0 Acres
Minerals[1]	17,462 Acres	0 Acres
Transportation and Utility System	NA	0 Acres
	Non-development Land Use Designations	
Old-growth Habitat	38,938 Acres	5,259 Acres (67% of project area)
Semi-remote Recreation	75,196 Acres	0 Acres
Remote Recreation	25 Acres	0 Acres

[1]Acres in the Minerals LUD are included in the Timber Production, Modified Landscape, Old-growth Habitat, and Semi-remote Recreation LUD acres.

Proximity to Wilderness and Other Roadless Areas

Past legislation and the 1997 Forest Plan determined the spatial placement and distribution of roadless area across the landscape of the Tongass NF. Most of Southeast Alaska is currently unroaded. Lands withdrawn by Congress such as Wilderness and National Monuments comprise about 41 percent of the Tongass NF. Approximately 90 percent of the Roadless Areas, which do not include Wilderness areas, are within the land use designations that would retain their unroaded condition. The Cleveland Roadless Area is a component of a much larger roadless land area that includes all of the Cleveland Peninsula through the Misty Fiords National Monument Wilderness Area, located about 21 miles to the east, and north through the Stikine Leconte Wilderness Area which covers 449,950 acres. South Etolin Island Wilderness is located northwest across Ernest Sound, approximately three miles away. The Cleveland Roadless Area is bordered to the northeast by the Frosty (#210) and North Cleveland (#529) Roadless Areas. Other nearby roadless ares include Behm Islands (#525) and North Revilla (#526) located southeast across Behm Canal from the area, and Kasaan (#520) located southwest across Clarence Strait. Additional roadless areas in proximity to the Cleveland Roadless Area are displayed in Table Roadless-2 and Table Roadless-3.

Table Roadless-2
Roadless Areas and Wilderness Contiguous to the Cleveland Roadless Area on the Mainland

Roadless/ Wilderness Area	Acres
Misty Fiords National Monument	2,285,000
Stikine Leconte Wilderness Area	449,950
Spires (#202)	542,829
Madan (#204)	69,126
Aaron (#205)	79,147
Cone (#206)	127,874
Harding (#207)	179,350
Bradfield (#208)	204,133
Anan (#209)	38,162
Frosty (#210)	45,522
Cleveland (#528)	190,230
North Cleveland (#529)	109,639
Hyder (#530)	116,304
Total Roadless Area on Mainland	**4,437,266**

Source: Tongass Land Management Plan FSEIS Roadless Area Evaluation for Wilderness Recommendations, 2003

Table Roadless-3
Roadless Areas on Islands Adjacent to the Cleveland Roadless Area

Roadless	Acres
McKenzie (#519)	80,650
Kasaan (#520)	7,605
Behm Islands (#525)	4,944
North Revilla Island (#526)	225,444
Total Roadless Area on Islands	**318,643**

Source: Tongass Land Management Plan FSEIS Roadless Area Evaluation for Wilderness Recommendations, 2003

Table Roadless-4
Total Roadless Area in Proximity to the Cleveland Roadless Area

Mainland vs. Island	Acres
Contiguous Mainland Roadless Area	4,437,266
Adjacent Roadless on Islands	. 318,643
Total Roadless Area in Proximity to the Cleveland Roadless Area	**4,755,909**

Source: Tongass Land Management Plan FSEIS Roadless Area Evaluation for Wilderness Recommendations, 2003

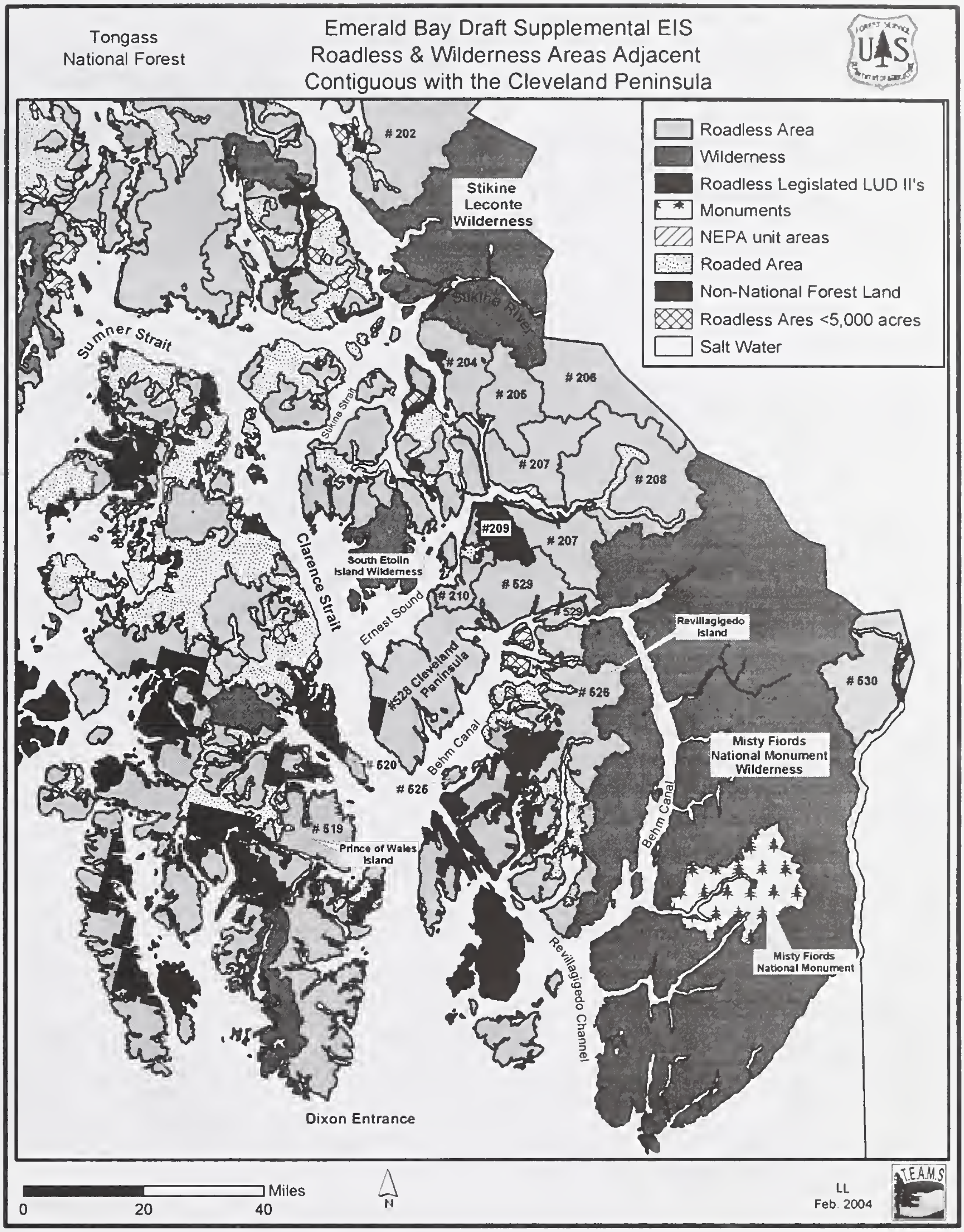
Proximity to Non-National Forest System Lands That Could be Developed

Few external influences are present in this roadless area. The Ketchikan Pulp Company owns a parcel of land in the Granite Creek and Helm Bay drainages. This area has the highest probability of change in the landscape that could influence the Cleveland Roadless Area. The area was logged in 1998 using helicopter systems. No roads were built to access the timber harvest areas. Sealask Native Cooperation manages the land in the southwest peninsula for timber. On the west side, lies the settlement of Meyers Chuck. Residents and visitors venture into the roadless area.

Landscape Character

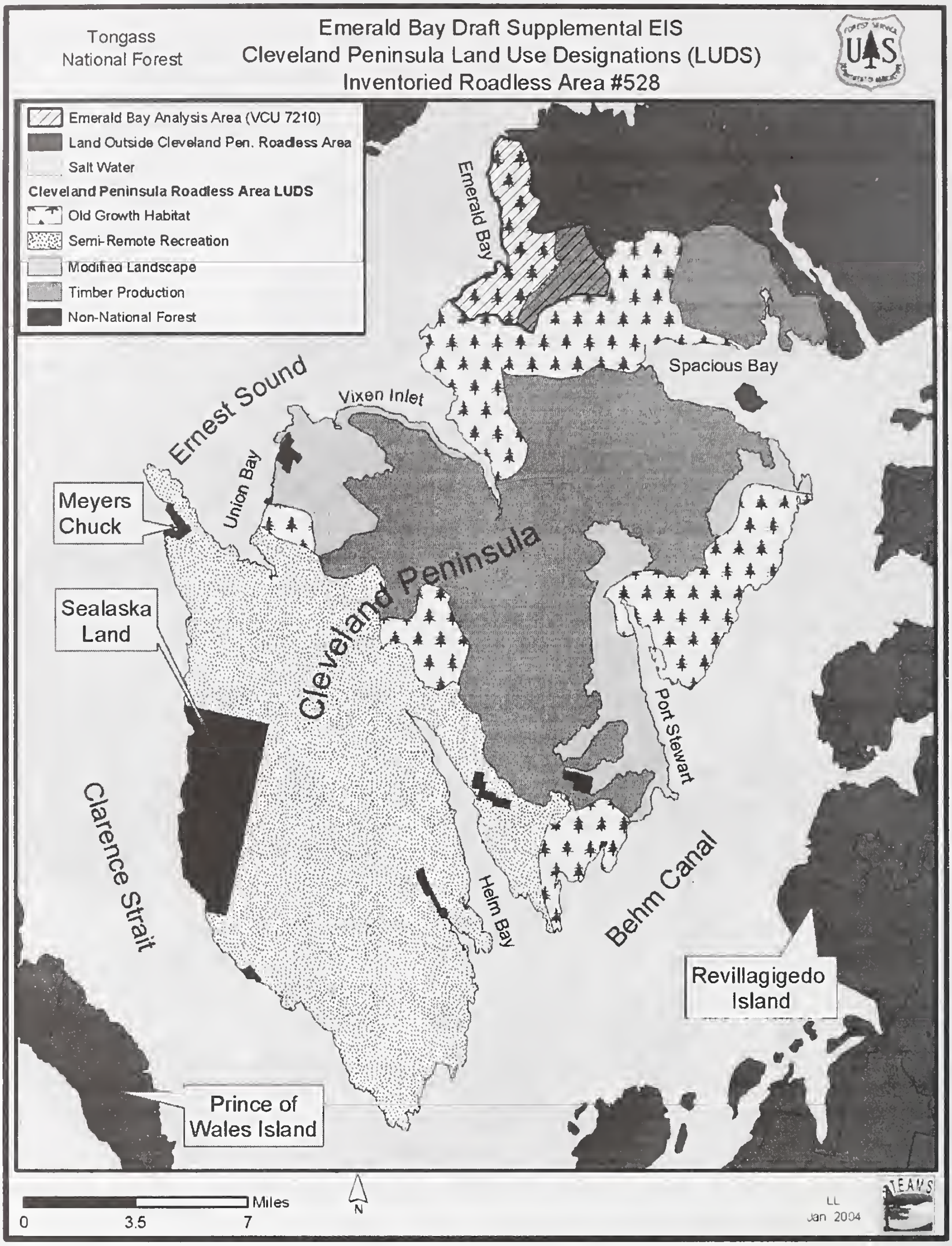
The project area generally displays natural characteristics when viewed from nearby water travel routes and when inside the area. The area has remained generally unaltered by human activity, with the exception of several areas where beach logging has occurred on the east side of the area. Mining and timber harvesting have occurred at Helm Bay. The area is predominately unmodified and is generally not fragmented by land ownership or land use patterns. The areas high degree of natural integrity is partly due to the surrounding large saltwater passages and adjacent large roadless areas.

Figure 3-1
Roadless and Wilderness Areas Adjacent and Contiguous with the Cleveland Peninsula



Source: Forest Service GIS, L.LaPorta 2004

Figure 3-2
Cleveland Roadless Area



Source: Forest Service GIS, L. Laporta, 2004

Diversity of Plants and Animals
Vegetation in the roadless area is typical of Southeast Alaska coastal temperate rain forest. Western hemlock, Sitka spruce and a cedar component are the dominant overstory species. The forest is interspersed with muskeg areas. Approximately 54 percent of the forested land is mapped as productive old-growth forest.

The Cleveland Roadless Area provides habitat for wolf and black bear, Sitka black-tailed deer, otter, marten, mink, loons and common waterfowl. Refer to the wildlife analysis in this chapter for additional information on animals and their habitats.

Social and Recreational Use
The outstanding saltwater fishing in the major bays is a key attraction to this area. Other recreation activities pursued in the area include boating, hiking, and camping. Three public recreation cabins (Rainbow Lake, Helm Creek, and Helm Bay) are located in the area. The Tongass Fish and Wildlife Resource Assessment indicated that eight of the VCUs located within this area are subsistence use areas with a high sensitivity to disburbance. Residents of Meyers Chuck use this area for subsistence use.

The Cleveland Roadless Area is mostly unmodified and natural appearing. The natural integrity and apparent naturalness is very high. The opportunity for solitude is very high and the opportunity for recreation is outstanding. The area provides primarily primitive recreation opportunities. The long-term recreation potential of the area centers on continued management of the cabin system and additional trails for dispersed recreation activity. There are 12 outfitter and guides with authorized use on the Cleveland Peninsula. Outfitter and guide operations may increase.

Reference Landscapes
There are no known features of ecologic, geologic, scientific, or cultural significance. There are no existing or proposed Research Natural Areas in this roadless area.

Traditional Cultural Properties
Numerous prehistoric and historical sites have been identified through archeological surveys and historical documents. Early settler history in this area centers on the fishing industry and mining. The community of Meyers Chuck was founded as the base for a fishing fleet and cannery. During the 1900's extensive exploration for minerals in Helm Bay took place, resulting in several patented claims. In the mid 1900's fishing, hunting and trapping took place in the general vicinity of Union Bay and Vixen Inlet. Helm Bay is the traditional origin place of the Kiks'adi clans from Wrangell and Sitka. Port Stewart is the traditional origin place of the Gonoxaidi clan of the Stikine Kwan. Refer to the Heritage Resources Section for additional information.

Environmental Consequences

Effects of Alternatives on the Cleveland Roadless Area

Summary
This section describes the effects of implementation of the alternatives on the Cleveland Roadless Area in terms of the size of the roadless area after harvest. Under all alternatives, the majority of the Cleveland Roadless Area would still maintain high values for resources other than timber management outside of the project area. Refer to the other resource analysis in this chapter for resource specific effects.

The 2003 SEIS identified roadless areas as generally beginning 1200 feet from existing roads and 600 feet form recent clearcuts. The appropriate zones have been applied to the harvest units and the proposed road in all of the action alternatives.

As documented in Appendix C of the FSEIS Roadless Area Evaluation; older units harvested by beach-logging and helicopter logging do not detract from the roadless characteristics since

these units are determined to be mostly naturally appearing (USDA Forest Service 2003, p C1-2). Part of this determination was made due to the helicopter units usually being partially harvested, and they would retain a forested, natural appearance after harvest is completed. Therefore, the areas treated by selection using the helicopter harvest system would retain their roadless characteristics.

Direct Effects to Roadless Area Characteristics

Soil, Water and Air

The Tongass Forest Plan Standards and Guidelines are designed to protect these resources while allowing timber harvest activities in development LUDs. None of the alternatives result in adverse effects on air, water, or soil resources. These resources are further protected by implementation of Best Management Practices. The complete analysis for these resources is discussed in this chapter.

Species Diversity

Species diversity is not anticipated to be reduced by implementation of any of the action alternatives. Viability of wildlife populations would be ensured by habitat maintenance through implementation of Forest Plan Standards and Guidelines and Best Management Practices. Fore additional information on species diversity refer to the Biodiversity and Old Growth, Essential Fish Habitat, and Threatened, Endangered and Sensitive Species sections of this chapter, as well as the biological assessment in Appendix B.

Habitat for Threatened, Endangered, Proposed, Candidate, and Sensitive Species; and for Species Dependent on Large, Undisturbed Areas

Forest Plan Standards and Guidelines and Best Management Practices are in place to protect these species. Refer to the Threatened, Endangered and Sensitive Species section of this chapter as well as the biological assessment in Appendix B.

Social and Recreation Use

No effects to social and recreation use from the proposed action alternative activities are expected. Refer to the Recreation Resources section in this chapter for additional information.

Reference Landscapes

Road construction in Alternatives B and D would reduce the amount of productive old growth within the project area by less than one percent of the POG within the OGR in the Cleveland Roadless Area. Except for tree removal in the road corridor, no other tree removal is proposed in any of the alternatives. The remainder of the OGR would remain in a natural setting providing an area for study, evaluation and monitoring. Refer to the Biodiversity and Old Growth section of this chapter for a complete description of effects.

Natural Appearance

Alternative A maintains the natural appearance of the area. Alternative B would clearcut 396 acres and harvest 205 acres with single-tree selection, an uneven-aged management prescription. The clearcut would result in a change in the existing unevenaged characteristic landscape to an even-aged landscape. Alternatives C and D propose 620 acres of uneven-aged harvesting. The uneven-aged harvest treatments would more closely resemble the natural characteristic landscape.

On a primary viewshed basis, only a very small portion of the proposed activities in the action alternatives would be visible from the Ernest Sound Alaska Marine Highway Ferry Route viewshed, and the Vixen Inlet viewshed. All alternatives would retain the characteristic landscape for this viewshed. The non-primary viewshed is the Ketchikan-Wrangell Aerial Flight Pat. Alternative A would maintain the existing landscape character. Alternative B would adversely change the characteristic landscape in this viewshed. Alternatives C and D

would partially retain the existing characteristic landscape. Refer to the Scenery section in this chapter for additional information.

Traditional Cultural Properties and Sacred Sites

No effects to any significant cultural resource sites from the proposed activities in the action alternatives are expected. Refer to the Heritage Resources section in this chapter for additional information.

Alternative A – No Action

No activities are proposed and there would be no effect on the Cleveland Roadless Area. Natural processes will continue to function and the roadless conditions remain as described above in the affected environment section.

Alternative B - Direct Effects

This alternative would harvest 601 acres of commercial forest land in eight harvest units through clearcut and single-tree selection. Two-hundred eighteen acres of harvest would utilize a helicopter logging system. Approximately 6.2 miles of new road would access the units; 2.2 miles of this road would bisect the medium Old-growth Habitat Reserve.

Alternative B would affect the roadless characteristics of 1,324 acres within the Cleveland Roadless Area. This constitutes less than one percent of the Cleveland Roadless Area. This acreage includes the non-helicopter/ partial cutting units, a 600 foot buffer around the units, and a 1,200 foot buffer around the proposed roads. The single-tree selection units harvested with the helicopter system are not included, since the 2003 SEIS determined that this harvest method left the treatment area mostly natural appearing after harvest is complete. The clearcutting would have long-term effects contrasting with the surrounding characteristic landscape.

The 2.2-mile portion of the road would directly affect the roadless characteristics of 614 acres or 1.6 percent of the Old-growth Habitat Reserve LUD within the Cleveland Roadless Area (this figure is included in the 1,324 acres described above). Overall, this constitutes less than one percent of the Cleveland Roadless Area.

Alternative C – Direct Effects

This alternative would havest 625 acres of commercial forest land in ten harvest units with group and single-tree selection. A helicopter logging system would be used for all units and no road construction would take place.

As documented in Appendix C of the 2003 SEIS, units harvested by beach logging and helicopter logging do not detract from the roadless area since these units were determined to be mostly naturally appearing. Part of this determination was made due to the helicopter units usually being partially harvested, and mostly naturally appearing after harvest is completed. Therefore, the areas treated by partial cutting using helicopter harvest system would retain their roadless characteristics. All of the units in this alternative would be partial cut using the helicopter harvest system.

Alternative D - Direct Effects

This alternative would havest 625 acres of commercial forest land in ten harvest units. Approximately 3.8 miles of new road would access the units; 2.2 miles of this road would bisect the medium Old-growth Habitat Reserve.

As documented in Appendix C of the 2003 SEIS, units harvested by beach logging and helicopter logging do not detract from the roadless area since these units were determined to be mostly naturally appearing. Part of this determination was made due to the helicopter units usually being partially harvested, and mostly natually appearing after harvest is completed. Therefore, the areas treated by partial cutting using helicopter harvest system would retain their roadless characteristics. The treatments would not detract from the Cleveland Roadless Area.

The 2.2-mile portion of the road would directly affect the roadless characteristics of 614 acres or 1.6 percent of the Old-growth Habitat Reserve LUD within the Cleveland Roadless Area (this figure is included in the acres described above). This constitutes less than one percent of the Cleveland Roadless Area.

Cumulative Effects

Past activities in the Cleveland Roadless Area include beach logging on the east side of the area, past and ongoing mining activities, and timber harvesting at Helm Bay. The FSEIS for roadless Area Evaluation for Wilderness Recommendations determined that even though these past activities have occurred; the general area has remained generally unaltered by human activity.

There are no currently planned or reasonably foreseeable activities in the Cleveland Roadless Area (Haley, P. pers. comm.). Therefore, cumulative effects are not expected for soil, water, air, species diversity; habitat for threatened, endangered, proposed, candidate, and sensitive species, and for those species dependent on large, undisturbed ares of land; reference landscapes, natural appearance, traditional cultural properties and sacred sites, and human disturbance.

Table Roadless-5
Comparison Table of Effects by Alternative

Alternative	Acres Without Roadless Characteristics	Percent of Cleveland Roadless Area Without Roadless Characteristics	Acres of Old-growth Habitat Reserve LUD Affected By Road Construction	Percent of Old-growth Habitat Reserve LUD Affected by Road Construction
A	0	0%	0	0%
B	1,324	<1%	614	1.6%
C	0	0%	0	0%
D	614	<1%	614	1.6%

Source: Forest Service GIS

Conclusion

Alternative B would affect the roadless characteristics of 1,324 acres within the Cleveland Roadless Area due to road construction and implementation of the clearcut silvicultural treatment. This alternative would have the greatest impact on roadless characteristics of all the action alternatives. Road construction in Alternative D would affect the roadless characteristics of 614 acres, however partial harvest treatment areas would retain their roadless characteristics. Under Alternatives A and C all areas would retain their roadless characteristics.

Silviculture and Timber Management

The following discussions and analysis are based on a variety of sources including existing data, and data gathered during field visits in 1998 and 1999. Additional background on forest land classification, silvicultural and logging systems, and other related topics may be found in the Forest Plan FEIS, Chapter 3: "Timber" and Appendix G. Applicable direction is contained in the Forest Plan, Chapter 2, Chapter 3 (Timber Production Land Use Designation), Chapter 4 (Forest-wide Standards and Guidelines), and Appendix A.

Affected Environment

The natural vegetation of the Emerald Bay project area is a mosaic of coniferous forest interspersed with alpine tundra, muskeg (bog), shrub land, estuarine, and beach fringe plant communities. The area contains seven forested plant series, all of which are commonly found throughout southern Southeast Alaska: Sitka spruce, western hemlock, and mountain hemlock series; western hemlock-yellow cedar and western hemlock-western red cedar series; and mixed conifer and shore pine series. The Biodiversity and Old Growth section of this chapter discusses aspects of old-growth forest not related to forest products. Various nonforested plant communities also occur in the project area, in estuaries, riparian areas, muskegs, alpine meadows, and alpine lichen rock outcrops.

Forest Land Classification

National Forest System lands are defined by vegetative cover, soil type, and administratively or congressionally designated land use. This classification scheme is intended to show the amount of land that is covered by forest vegetation with further divisions to show the amount of land capable of, or available for, timber production. Appendix A of the Forest Plan provides a detailed discussion of timber resource land suitability. To be considered both suitable and available for harvest, lands must be determined tentatively suitable for timber management, and must be within a land use designation that allows timber harvest. For the project area, this is the Timber Production Land Use Designation (LUD). Forest Plan Standards and Guidelines apply within the Timber Production LUD and additional areas such as riparian management areas, wildlife nest or den buffers, are unavailable for timber harvest.

To be considered suitable for timber management, forested lands must not only be within developmental LUDs, they also must be capable of producing 20 cubic feet of tree growth annually, and/or must contain at least 8,000 board feet of net timber volume per acre. These are termed "commercial forest lands" (CFL). In the Biodiversity and Old Growth, and Wildlife sections of this chapter, CFL is divided into productive and nonproductive components.

National Forest System lands within the project area total 7,845 acres (there is no non-National Forest System land within the project area). Of the 7,845 acres of forest land, 6,888 are classified as unsuitable for timber management, either through land use designation (as Old-growth Habitat), standards and guidelines (riparian areas and the beach fringe), or soils or slope criteria. This leaves 957 acres currently tentatively suitable and available for timber harvest.

Forest Health

Alaska Yellow Cedar Decline

Alaska yellow cedar decline is a disease causing considerable mortality in Southeast Alaska. Mortality can be in small patches or cover expansive areas. Affected trees may die within 2-3 years, or over a 15-year period, or longer, with crowns progressively thinning. The cause of Alaska yellow cedar is not completely understood, but the disease is generally associated with boggy conditions near muskegs. The primary cause of mortality is unknown, and no single factor has been shown to be primarily responsible for tree death (Hennon et al, 1990). There is a large amount of Alaska yellow cedar decline occurring in the project area; fifty-four percent of the yellow cedar trees are dead (USDA Forest Service 2001).

Past Harvest

A small portion (approximately 14 acres) of the Old-growth Habitat Land Use Designation near the estuary was harvested approximately 60 years ago. Historically, single-tree beach harvest has also taken place in the project area.

Environmental Consequences

Goals and objectives for various land use designations and the application of appropriate standards and guidelines found in the Forest Plan would result in the use of a wide range of silvicultural systems from traditional even-aged clearcuts to uneven-aged group and single-tree selections. Alternative B prescribes a mixture of clearcutting and selection cutting. Alternatives C and D are entirely uneven-aged management (single-tree and group selection). Spatial distribution of retained trees would vary between harvest units and alternatives depending on resource objectives, site conditions and logging systems. Proposed harvest units range from 7 acres to 208 acres in size. No created openings exceed 100 acres. Unit-specific silvicultural prescriptions are outlined in the unit cards and are located in individual stand folders that are a part of the Emerald Bay project planning record.

Silvicultural Systems

The term "silvicultural system" refers to a planned process whereby a stand is harvested, re-established and tended. The system name is based on the number of age classes present after the initial harvest, such as even-aged, two-aged and uneven-aged systems.

Even-aged systems produce stands that consist of trees of the same or nearly the same age. A stand is considered even-aged if the range in tree ages normally does not exceed 20 percent of the age at which the stand is to be harvested (the "rotation age"). Clearcutting proposed in Alternative B would produce even-aged stands.

Uneven-aged systems create stands that include three or more distinctly different age classes. Uneven-aged conditions are created through management by using single-tree or group selection methods. Uneven-aged systems are proposed in Alternatives B, C, and D.

Even-aged more closely mimic the natural conditions of the large-scale disturbance ecologies (for instance, areas subject to windthrow) found throughout Southeast Alaska. Uneven-aged systems more closely mimic the gap-dominated old-growth ecosystems (where large-scale disturbance is not a major factor) found throughout Southeast Alaska. Although management practices in Southeast Alaska have used predominantly even-aged systems, recent studies on alternatives to clearcutting have provided valuable information on the local applicability of these systems. (McLellan, M. et al. 2000, Deal and Tappeiner 2001).

For a detailed discussion of silvicultural systems and methods, see the Forest Plan FEIS, Appendix G. Factors influencing and criteria for selection of appropriate harvest methods and silvicultural systems are also presented in the National Forest Management Act implementing regulations (36 CFR 219.27) and the Forest Service Manual.

Silviculture

Regeneration

All of the areas proposed for timber harvest are expected to be restocked within 5 years, as required by National Forest Management Act regulations (36 CFR 219.27(c)). Stands with comparable site conditions have received similar silvicultural treatment and resulted in full stocking within five years of harvest. Regeneration (stocking) surveys would be conducted on harvest units, in all of the action alternatives to verify stocking.

Successional Stages and the Desired Condition

After reforestation, managed forests grow through several distinctive successional stages in which different components dominate the stand and forest structure changes over time. Alternative B would convert the 396 acres to an even-aged, managed forest while attempting to maintain 205 acres in a regulated, uneven-aged condition. Alternatives C and D utilize uneven-

aged management prescriptions and would follow successional pathways similar to gap-dominated old-growth forests.

Post-treatment stand composition is displayed in Table ST-1 and is based on remaining volume. Table ST-2 displays post-treatment stand age, stocking, and diameter. The Biodiversity and Old Growth section of this chapter has additional discussion regarding stand composition and structure.

Table ST-1
Post-treatment Stand Composition, Based on Merchantable Volume

Species	Alternative A (Existing)	Alternative B		Alternative C	Alternative D
		CC[1]	STS[2]	Grp[3] & STS	Grp & STS
Alaska Yellow Cedar	29%	0%	32%	32%	32%
Western Red Cedar	16%	0%	17%	17%	17%
Sitka Spruce	13%	0%	13%	13%	13%
Western Hemlock	42%	0%	38%	38%	38%

Source: USFS, C.Grundy, 2001
[1]CC = Clearcut; 10-20% of the original, existing stand would be retained in clearcut units; 80-90% would have no merchantable volume remaining except for trees remaining to meet wildlife standards and guidelines.
[2]STS = single-tree selection
[3]Grp = group selection

Table ST-2
Post-treatment Stand Age, Stocking, and Average Diameter (quadratic mean)

Post Treatment Attribute	Alternative A	Alternative B		Alternative C	Alternative D
	(Existing)	CC[1]	STS[2]	Grp[3] & STS	Grp & STS
Average Stand age (years)	105	0	105	105	105
Average Stocking (sq..ft./ac. Basal Area)	279	0	133	127	127
Average Stand Diameter (inches)	27	0	27	27	27

Source: USFS, Emerald Bay Stand Tables by Strata, 2001; GIS volstrata/unit, 2004; stand age, P.Haley, pers.comm.
[1]CC = Clearcut; 10-20% of the original, existing stand would be retained in clearcut units. 80-90% would have no stocking other than trees remaining to meet wildlife standards and guidelines.
[2]STS = single-tree selection
[3]Grp = group selection

The land use designation allowing timber harvest activities within the project area is the Timber Production designation. The Forest Plan desired condition for Timber Production emphasizes a balanced mix of age classes. Alternative B would move the project area toward the desired condition by creating a balanced mix of stand structures and ages. Alternatives B

and D would emphasize maintaining the uneven-aged condition that is prevalent throughout the Cleveland Peninsula.

Alternative A proposes no timber harvest and converts no stands to a managed condition.

Alaska Yellow Cedar Decline

Treatments in all action alternatives would harvest an estimated net volume of 2,776 CCF (1,388 MBF) of dead standing Alaska yellow cedar. This volume would remain in the forest to decay in Alternative A.

Long-term Timber Productivity (Yield)

All stands proposed for harvest are overmature and well beyond the age of maximum average annual growth of the stand. Most are representative of uneven-aged western hemlock stands that commonly take hundreds of years to develop under natural conditions. Harvest increases forest floor temperatures, speeding up organic decomposition and increasing the supply of available nutrients to the trees. The effects of Alternatives C and D on long-term yield would be the conversion of unmanaged, slow growing, overmature stands to regulated, multi-aged stands. Immediate change would be less than in Alternative B; however, over the course of several cutting cycles this difference would begin to level out.

Single-tree selection would likely result in some logging damage to residual trees. The thin bark and shallow roots of hemlock and spruce make them particularly susceptible to logging injury, which leads to decay, especially in hemlock (Burns 1983). Decay reduces timber productivity. Alternative B has the least single-tree selection and would result in less damage to residual timber. Alternatives C and D have the same amount of single-tree selection and would result in similar amounts of damage to residual timber.

The open conditions created by even-aged systems applied in Alternative B allow for more rapid regeneration. With the use of precommercial thinning, an increase in the spruce and cedar components can be attained in an attempt to restore the original stand composition. Immediate effect on long-term productivity and yield is expected to be greatest in this alternative.

Post-harvest Evaluation

Post-harvest activities applied to Alternatives B, C and D would include regeneration surveys as well as evaluation of residual stands following harvest.

Timber Financial Efficiency Analysis

Current Forest Service Handbook direction (FSH 2409.18; Amendment 90-1 and Supplement 6) requires a financial efficiency analysis to compare benefits and costs of a project. Values used in the analysis reflect current timber value estimates using standard timber (transactional evidence) appraisal procedures. For this analysis, the current market is defined as the market conditions for the 2nd quarter of 2003. The financial efficiency analysis compares expected gross revenues against estimated costs and arrives at an estimate of net revenues or stumpage values.

Table ST-3 displays the major timber sale financial components for each action alternative on a per-CCF basis at current market conditions. "Harvest Volume" includes total volume (sawlog and utility or cull) expected to be available under each alternative. The "Transportation Costs" component includes "stump-to-truck" logging costs, such as felling, bucking, yarding, loading, and related costs such as haul, log transfer, tow and raft as well as administration and profit and risk. "Construction costs" include all capital investments for the Emerald Bay project such as pit development, road construction, bridges and post project remediation. "Average Cost/CCF" displays the total cost for each alternative (Transportation plus Construction). "Net Revenue" displays the net revenue (also referred to as net stumpage) for each alternative after costs are subtracted from gross value.

Table ST-3
Timber Values and Costs by Alternative for Current[1] Market Conditions

	Alt. A	Alt. B	Alt. C	Alt. D
Total Volume (CCF)	0	32,749	24,359	24,783
Transportation Costs (Million $)	0	4.75	9.81	5.16
Construction Costs (Million $)	0	1.106	0	0.58
Average cost/CCF ($)	0	179.11	403.08	231.53
Net Revenue (stumpage) @ Current Market	0	47.55	-189.38	-29.40

[1]NEAT 2Q2003
Source: Forest Service, M.North 2003

The Average Cost/CCF measure can be used to compare the overall financial efficiency of the alternatives. The average cost is highest per CCF in Alternative C, which proposes to use helicopter yarding to eliminate road and LTF construction. The most efficient average cost per CCF is Alternative B. This alternative emphasizes more conventional clearcut harvest, cable yarding systems associated with a road system and less helicopter logging. Table ST-4 displays harvest volume by logging system for each alternative.

Table ST-4
Comparison of Alternatives – Harvest System and Roads

Category	Unit of Measure	Alt A	Alt B	Alt C	Alt D
Harvest System					
Long Span Cable	acre	0	75	0	0
Short Span Cable	acre	0	299	0	0
Helicopter	acre	0	218	620	609
Shovel	acre	0	9	0	11
Roads					
New Construction	mile	0	6.2	0	3.8
LTF Construction	#	0	1	0	1

Source: M. North

Alternative D reduces the long helicopter flight distances associated with Alternative C by constructing a haul road. This haul road is responsible for the increased financial efficiency.

The projected stumpage values are also useful for comparing the alternatives. Positive stumpage values generally indicate financial viability. Alternative B shows a positive stumpage value, while Alternatives C and D show negative values for the current market condition. Alternative B is the most economically viable alternative. This can be attributed to road development and reliance on cable logging systems. The economic viability becomes negative with Alternatives C and D, which rely on less road and increased helicopter yarding.

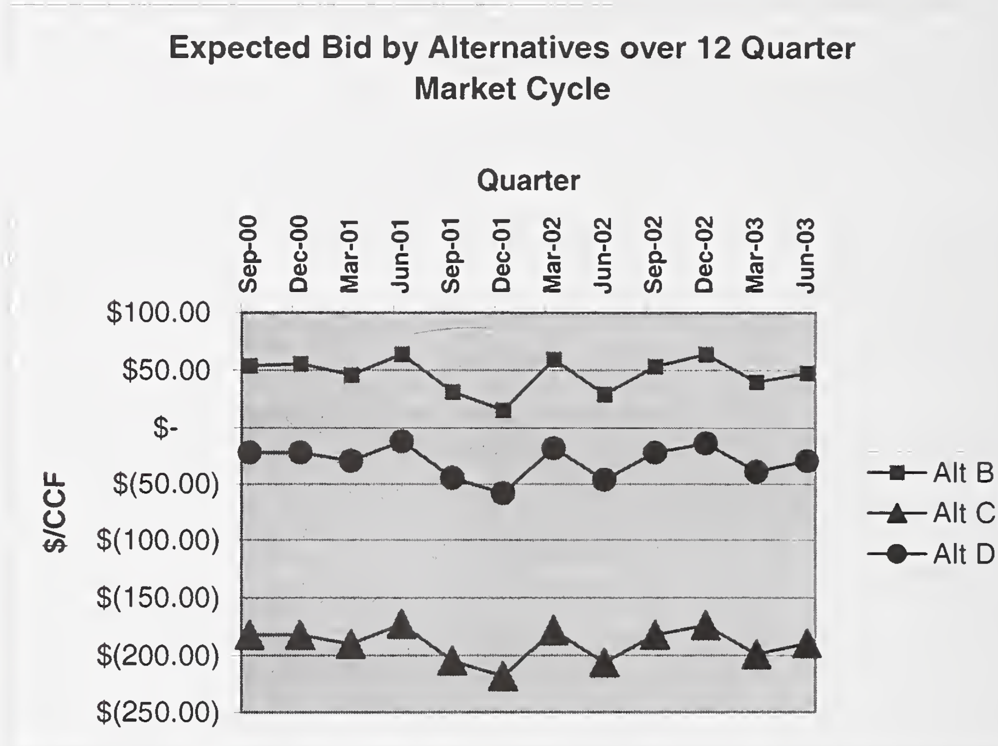
When a sale appraises deficit, such as Alternatives C and D, it must be advertised for not less than base rates (the value needed to recoup cost to the government and ensure required regeneration). The base rate value of Alternative C is $107,179 and Alternative D is $109,293.

The Nepa Economic Analysis Tool (NEAT) predicts the expected bid value for each alternative's mix of species and logging systems, using Region 10's Transactional Evidence

Appraisal Data. Predicted bid values area displayed in Figure ST-1. The model indicates that Alternative B is the only economically viable alternative. Alternatives C and D would not sell under current or foreseeable market conditions.

The Regional Forester has authorization to change timber utilization standards, or allow the export of western redcedar logs to improve the economics of a timber sale. NEAT allows the planner to test these tools. Neither of these tools helps the economics of Alternatives C and D. Currently, there is very little difference between the export and the domestic market for western redcedar. Changing the utilization standards increased the road construction cost per unit of harvest volume, for Alternative D, by reducing the volume those costs are amortized against.

Figure ST-1 Expected Bid by Alternatives



Source: Forest Service, NEAT, M.North, 2003

Cumulative Effects

The Frosty Bay Timber Sale, which was harvested in 1993, is located 13 miles north of the Emerald Bay project area in a separate watershed and is the only other ground-disturbing activity which has occurred in the general vicinity of the project area. It harvested 1,184 acres and built 12 miles of road. The distance between these projects precludes impacts on or from the Emerald Bay project.

For the Emerald Bay project action alternatives, harvest is scheduled to be completed by 2009. At that time, approximately 41 percent (396 acres) of the suitable timber base would have been clearcut and reforested under Alternative B. An additional 205 acres would be moving toward a regulated uneven-aged condition.

Alternatives C and D, by maintaining uneven-aged stands, would retain at least 50 percent of the basal area on 620 acres of suitable land. Secondary treatments would not be scheduled for at least 50 years.

Other harvest planned on National Forest System land in the vicinity of the Emerald Bay project is not expected to affect or be affected by the activities of the Emerald Bay project. These are discussed in the Introduction to this chapter.

Socioeconomics

Affected Environment

Socioeconomic Setting

Survey information shows the principal users of the Emerald Bay project area are from the Meyers Chuck community with potential additional use coming from Wrangell, Ketchikan, and Thorne Bay (Forest Plan FEIS, pp. 3-529 to 3-680). Community use of the area, such as for recreation, hunting, or subsistence, is discussed in the Recreation, Scenery, and Subsistence sections of this chapter.

There is no comparable community-specific employment information available. The closest is subregional information for all Prince of Wales Island and outer Ketchikan communities combined; within this there is a breakdown for Cleveland Peninsula (Forest Plan FEIS, pp. 3-514 to 3-516). In 1995, there were 14 wage or salary jobs in the Cleveland community group. Of these, all were lodging or recreation-related jobs. However, for the subregion of Prince of Wales and outer Ketchikan there were 490 (22.4 percent of all jobs) wood-product related jobs. While this is the highest ratio of logging-related jobs to all jobs in Southeast Alaska, it still represents a 30 percent decline in the previous 5 years.

Environmental Consequences

Employment and Income Effects

Effects related to community uses of the area are discussed in other sections of this chapter, as noted above. The Proposed Action would include direct and indirect impacts to the economy. To estimate the amount of employment and income likely to result from timber harvest alternatives, a simple conversion of board feet to jobs and income is made, using multipliers developed for Southeast Alaska (Forest Plan FEIS, p. 3-480). Table SE-1, below, shows the employment and income estimates for each alternative. These figures represent the number of jobs in logging, construction, marine transport, and sawmills directly related to each alternative. The sawmill component of the jobs is for milling of the spruce, hemlock, and western redcedar. Jobs for milling Alaska yellow-cedar are not included because it's usually exported. As would be expected, the higher the harvest, the more jobs and income that result.

Table SE-1
Logging-related Employment and Income by Alternative

	Alt. A	Alt. B	Alt. C	Alt. D
Employment (# jobs)	0	86	64[1]	65[1]
Income (million $)	0	3.85	2.86[1]	2.91[1]

[1]Number of jobs and associated in come if market conditions improve sufficiently to make the alternatives economically viable
Source: Forest Plan FEIS, p. 3-480

Public Investment Analysis

Public investment analysis of each alternative compares the value of the timber with the cost of preparing the timber sale. The average Region 10 Budget Allocation costs and management expenses are subtracted from the net stumpage (revenue) to determine net value to the public. The costs and management expenses include environmental analysis, sale preparation, sale administration, and engineering support.

Environmental analysis costs include field inventory and the analysis of data, public involvement, and the preparation of a document that satisfies the requirements of the National Environmental Policy Act. The timeframe is about 2 years and involves many resource specialists. Although it is based on timber volume, the cost fluctuates more with the amount of area to be examined and the accessibility of the area. The Emerald Bay project area is accessible by boat, float-plane, or helicopter which increases all costs associated with the project including environmental. The environmental analysis cost is constant and applies to all alternatives, including the No-action Alternative.

Unit layout and cruising costs increase significantly when partial harvest is prescribed compared to clearcutting. The Alternatives-to-Clearcutting Research Study on the Kupreanof Island required about eight times more person-days-to prepare a unit that involved marking individual trees throughout the unit compared to a clearcutting. Accessibility to the units is another major cost factor. Helicopter access and steeper terrain increase sale preparation costs compared to areas with existing road access.

Using these cost factors, Alternative B would be the least costly to prepare because 2/3 of the harvest area is clearcut. Alternative C and D would be more costly than B due to the costs associated with marking and cruising the selection prescriptions. Units C and D have comparable costs, however Alternative D would have additional costs for road layout.

Sale administration costs are higher when helicopter logging is involved because of the increased cost of accessing the harvest area for administration. Because of the higher sale administration costs for helicopter yarding, Alternative C would have higher costs than other action alternatives. Alternative D would be the next most costly.

Other Resource Values

Non-timber Harvest Values

The Forest Service is not required to quantify the non-market benefits and costs associated with every timber sale. However, the Forest Service is required to insure that all environmental amenities and values are given appropriate consideration in decision making along with economic and technical considerations. This Draft SEIS analyzes the potential effects of the project on environmental amenities and values such as water resources, roadless quality, recreation and scenery, wildlife, subsistence, and social concerns. There are no expected significant impacts on resources such as hunting, fishing, recreation, or tourism.

Payments to the State of Alaska

In previous years, 25 percent of the returns to the U.S. Treasury from revenue producing Forest Service activities were returned to each State containing National Forest system lands and then distributed to counties (or, in Alaska, to Organized and Unorganized Boroughs) with National Forest system acreage within their boundaries. These were termed "25 percent fund payments" and were dedicated to schools and roads. More recently, in order to stabilize these payments in the face of declining Forest Service timber harvest and associated revenues, Congress enacted the *Secure Rural Schools and Community Self-Determination Act of 2000*. Under this act, boroughs can elect to receive a "full payment amount", which is the average of the highest three payments made between 1986 and 1999. The act makes this option available through fiscal year 2006.

Under the full payment approach, Forest Service payments to the State of Alaska during the 2001-2006 period would not be directly linked to annual revenues, but instead, would be based on the historic "high three-year" average. Total revenues during the 2001-2006 period are expected to be considerably less than this "high three-year" average, so, the full payment approach was selected by all Alaskan affected boroughs, and the difference in revenues across the planning alternatives would have no effect on the payments these boroughs receive.

Energy Requirements and Conservation Potential of the Alternatives

The implementation of the proposed alternatives would require the expenditure of energy (consumption of fuel). The amount of energy used varies by alternative, based on the timber

volume harvested, the type of harvest system used, the amount of road constructed, and sale preparation and administration.

Fuel consumption requirements were estimated as follows:

Timber Sale Preparation and Administration	1.56 gallons per MBF
Cable/Shovel Logging	2 gallons per MBF
Helicopter Logging + 75 percent for each distance category	8 gallons per MBF
Load, Haul, Raft, and Tow	8 gallons per MBF
Road Construction	4,000 gallons per mile
Road Maintenance	20 gallons per mile

The estimated fuel consumption required for each alternative is displayed in Table SE-3.

Table SE-2
Estimated Fuel Consumption (Thousands of Gallons) by Alternative

	Alternative			
Activity	**A**	**B**	**C**	**D**
Cable/Shovel Logging	0	21.2	0	0.4
Helicopter Logging	0	46.2	319.1	97.4
Load, Haul, Raft, Tow	0	131.0	24.4	99.1
Road Construction	0	24.8	0	15.0
Road Maintenance	0	0.1	0	0.1
Sale Prep/Administration	0	25.5	19.0	19.3
Total Consumption	**0**	**248.8**	**362.5**	**231.4**
Average Gallons/CCF	0	7.6	31.4	10.9

Source: Forest Service, M. North

Indirect and Cumulative Effects

The Frosty Bay Timber Sale, which was harvested in 1993, is located 13 miles north of the Emerald Bay project area in a separate watershed. It is the only other ground-disturbing activity, which has occurred in the general vicinity of the project area. It harvested 1,184 acres and built 12 miles of road. Any socioeconomic effects associated with Frosty Bay are not expected to add to or detract from those associated with Emerald Bay due to the 10-year interval between expected effects.

Soils and Geology

The following discussions and analysis are based on pre-existing data combined with additional data collected in the field for the Emerald Bay project and is confined to the project area and proposed units. This report is divided into two sections, 1) soil productivity, and 2) surface erosion and mass movement. A Forest-wide treatment of soils may be found in the Forest Plan FEIS, Chapter 3. Applicable soils direction is included in the Forest Plan, Chapter 4 and Appendix C. General and site-specific mitigation measures are listed in the road and unit cards.

Affected Environment

Geomorphology and Geology

Uplift and valley glaciations have shaped much of the Emerald Bay project area landscape. Rock types are mostly of granitic or sedimentary origin.

The soils of the Emerald Bay project area are predominantly underlain by till at elevations less than about 1,000 feet. The upper limit of glacial till on the valley sides of the Emerald Bay watershed is about 1,200 feet. The thickness of the till deposits is extremely variable. As elevations increase and slopes increase, soils are typically less than 20 inches thick and underlain by bedrock. On the broad, gently sloping ridge tops, organic soils have accumulated, typically to depths of more than 2 feet.

The Emerald Bay project area topography and landforms are characterized by a small U-shaped valley and broad ridges trending southwest, with a steep ridge running northwest and dropping directly into Ernest Sound. Soils are dominantly well drained and productive on the valley side slopes supporting hemlock/spruce forests. The broad ridge tops and the valley bottoms are covered with a combination of organic soils supporting bog vegetation and well-drained hemlock/spruce forests.

Karst Resources

Karst is a comprehensive term that applies to the unique topography, surface and subsurface drainage systems, and landforms that develop by the action of water on soluble rock - in the case of Southeast Alaska, limestone and marble. The dissolution of the rock results in the development of internal drainage, producing sinking streams, closed depressions, and other solution landforms such as sinkholes, collapse channels and caves (White et al. 1995). The Emerald Bay project area has no known karst features.

Soil Productivity

Soil productivity in the project area is primarily a function of soil drainage, soil depth, parent material, and climate. Only soil drainage and soil depth may be impacted by the project. The Tongass Land Management Plan identified three soil productivity concerns that are pertinent to the soils on the Emerald Bay project area. The three concerns are soil productivity loss due to construction of roads and development of rock pits, soil productivity loss due to soil displacements on shallow organic soils (McGilvery soils) and soil productivity loss due to slight changes in soil drainage as a result of harvesting timber from relatively low volume stands growing on poorly drained organic soils.

There are no existing roads or rock pits on the project area.

Forested, poorly drained organic soils are extensive in the Emerald Bay project area; 1,311 acres have been mapped. Concerns with timber harvest on these soils include the ability of the site to grow 20 cubic feet of wood (on average) per year. These soils occur adjacent to units 1, 2, 5, 9, 11, and 12 on the Emerald Bay project area. The environmental consequences of timber harvest on these sites will be discussed in the wetlands section.

Approximately 462 acres of McGilvery soils have been mapped in the Emerald Bay project area. McGilvery soils consist of well-drained organic matter less than 20 inches thick over

bedrock. McGilvery soils commonly occur in small patches near rock outcrops and on steep convex slopes. McGilvery soils mapped on the project area occur on steep north and northwest facing slopes. Dragging logs across areas of thin McGilvery soils can physically displace, or remove the soil from a spot or yarding corridor. Field reconnaissance identified several areas of McGilvery soils within and adjacent to proposed harvest units. Where soil displacement would likely exceed Regional soil quality standards the area of McGilvery soil not included in the harvest unit. Units 3, 7, 8, 10, and 11 are examples of areas that were dropped, at least in part because harvest would have caused detrimental impacts to the soil resource.

Soil Erosion and Mass Movement

The relatively thick organic mat covering most mineral soils in the project area helps prevent surface erosion. Where the organic mat is displaced or mineral soil is exposed, surface erosion can occur. Yarding of logs can displace the organic mat and allow surface erosion of underlying mineral soils. In steep, forested terrain with high soil-water levels, mass wasting (landslide) is the dominant erosion process (Swanston 1969). Topographic, geologic, and soil conditions usually determine where a landslide would occur, but rainfall is probably the principal triggering force determining when landslides would occur (Patric and Swanston 1969).

Steep forested terrain occurs mostly on the north end of the Emerald Bay project area. Swanston (1991) inventoried landslides over 100 cubic yards in size across the Tongass NF. Landwehr (1998, unpublished) inventoried landslides on the northern Prince of Wales Island with no minimum size limit. Table Soils-1 displays the results of the two inventories on a landslide per acre basis.

Table Soils-1
Results of Landslide Inventories in Southeast Alaska

Inventory	Unharvested rate	Harvested rate	Road rate
Swanston (1991)	1 slide/8,021 ac/20 yrs	1 slide/2,348 ac/20 yrs	N/A
Landwehr (1998 unp)	1 slide/6,239 ac/20 yrs	1 slide/622 ac/20 yrs.	1 slide/19 miles/20yrs.

Source: Forest Service, D.Landwehr

Table Soils-1 data indicate that Swanston (1991) found fewer landslides than Landwehr's 1998 inventory. The Swanston inventory did not document landslides smaller than 100 cubic yards. Landwehr documented all slides visible on aerial photos. Both authors reported that landslides in harvested areas tend to be smaller than landslides in unharvested areas.

Naturally unstable areas in the Emerald Bay project area include the extremely steep slopes facing saltwater north of the Emerald Creek Drainage and the headwaters of the Emerald Creek Watershed on the very east side of the project area.

The Forest Service uses a mass movement index (MMI) for preliminary identification of potentially unstable sites in a project area. The mass movement index summarizes the physical properties of a soil and rates the relative stability of the soil. MMI 4 soils are most mineral soils occurring on slopes in excess of 72 percent gradient and some mineral soils with restricted drainage on slopes greater the 60 percent gradient. 1,845 acres of MMI 4 soils are mapped on the Emerald Bay project area. MMI 4 soils were not included in the timber base used to develop the Emerald Bay unit pool. All proposed harvest units with slopes over 50 percent gradients or some indicator of instability were field reviewed by a soil scientist. Units 3, 7, 8 and portions of unit 10 and 11 were excluded from the unit pool due to concerns about slope stability and harvest on shallow soils on steep slopes following soil scientist reconnaissance. Unit 3 was modified to exclude a steep slope section and change one setting to partial harvest for slope stability concerns. In a few cases the soil scientist identified slopes greater than 72 percent that are suitable for timber harvest due to low landslide potential. Table Soils -2 lists

proposed harvest units and the approximate acreage of slopes over 72 percent gradient by harvest unit.

Table Soils-2
Acres of Slopes over 72 percent Gradient Identified as Suitable for Timber Harvest by IDT Soil Scientist (Field Estimates).

Unit Number	Acres of slopes over 72 percent	Watershed	Included in Alternatives
3	11	Emerald Ck	B, C & D
5	1	Emerald Ck	B, C & D
6	2	Emerald Ck	B, C & D

Source: Forest Service, D.Landwehr

Harvest on the steep slopes would be partial cut with full suspension via helicopter yarding in all three action alternatives.

Environmental Consequences

Soil Productivity

Road construction and rock pit development cover areas of soil with rock and overburden, effectively reducing the productivity of the site. In most cases reclamation of shot rock roads is not practical. Efforts to reclaim rock from shot rock roads typically recapture about 50 percent of the original rock volume. Removal of all rock from these roads would result in much soil disturbance and erosion. In most cases the environmental damage caused by removing all of the rock would probably be more than leaving some or all of the rock in place. If roads are constructed and then abandoned, red alder would grow on most road surfaces of the project area

There are no existing roads on the Emerald Bay Project Area. Alternatives A and C do not propose any new road. Alternative B proposes 6.2 miles of road; 4.7 miles of the proposed road would lie within the Emerald Creek Watershed. Approximately 0.6 miles of road would be constructed in the upper end of the Wasta Creek Drainage and another 0.9 miles of road would be constructed in a first order watershed just west of Emerald Creek. The roads and associated rock pits would impact about 36 acres of land. The land impacted by the road is approximately 0.5 percent of the project area.

Alternative D proposes 3.8 miles of roads and associated rock pits, which would impact about 22 acres of land. The land impacted by the road is approximately 0.3 percent of the project area. The analysis assumes a 40-foot wide disturbed soil area, or 4.8 acres per mile of road. The analysis also assumes a 2 acre rock pit for every 2 miles of proposed road.

Soil disturbance within harvest units can have a detrimental impact on soil productivity, especially on areas of well-drained organic soils underlain by bedrock at shallow depths (McGilvery soils). Soil disturbances are areas where felling of trees or yarding of logs has displaced the surface organic mat. Small soil disturbances are not considered detrimental to soil productivity. Disturbances larger than 100 square feet are considered detrimental to soil productivity (Region 10 Soil Quality Standards). These larger disturbed areas are referred to as soil displacements. Landwehr (1997 unpublished) monitored soil disturbances and soil displacements on slopes over 75 percent gradient on the 89-94 Long-Term Sale area. Landwehr found that partial suspension cable logging on these steep slopes resulted in approximately 4.2 percent of the soil surface displaced. Full suspension yarding resulted in approximately 1.7 percent of the soil surface displaced. Table Soils-3 displays the estimated acres of soil displacement by alternative. The analysis assumes 5 percent displacement for areas where partial suspension is planned and 2 percent displacement for areas where full

suspension yarding is planned. The estimates given in Table Soils-3 are coarse and based on timber harvested from very steep slopes. In all likelihood soil displacement on gentler slopes would be much less. Partial harvest prescriptions are planned for 620 acres in alternatives C and D and 205 acres in alternative B. Although no soil displacement monitoring information is available for partial harvest with helicopter yarding, the partial harvest prescriptions would probably result in less soil displacement than clearcut harvest.

Table Soils-3
Effects on Soil Productivity by Action Alternative

Alternatives	Productivity Loss from Roads (acres)	Displaced Soils from Harvest (acres)	Rock Pits (number)
A	0	0	0
B	36	29	3
C	0	15	0
D	18	15	3

Source: Forest Service, D.Landwehr

McGilvery soil areas were identified during unit reconnaissance. Where soil displacement was likely to exceed Region 10 Soil Quality Standards (based on past monitoring results, Landwehr, 1997 unpub.) the areas of McGilvery soil were not included in the harvest unit. Small areas of McGilvery soils are included in the helicopter log, partial cut portion of unit 3.

Direct and Indirect Effects

The intent of the Regional Soil Quality Standards is to maintain soil productivity within acceptable standards. The standards allow up to 15 percent of the productive forestland to be in a detrimental condition. Monitoring of Regional Soil Quality Standards on the 89-94 project area (Landwehr, 1997 unpublished) found that typically less than 5 percent of the soils in steep slope timber harvest units are left in a detrimental condition. Partial cutting is planned for 620 acres of alternatives C and D and 205 acres of Alternative B. Helicopter yarding would be required to harvest the partial cut harvest units. Given the partial harvest prescriptions and the use of helicopter yarding for the steeper slope areas, soil displacements and other detrimental impacts to soil resources within harvest units would very likely be within Soil Quality Standards

Surface Erosion and Mass Movement

Due to the relatively thick organic mat covering most mineral soils, surface erosion is limited to detrimentally displaced areas, roads, stream banks and recent landslide tracks. Detrimentally displaced areas within timber harvest units are routinely slashed and seeded shortly after they occur (BMP 13.11). Slashing the disturbed site provides soil cover, reducing the force of raindrop impact and the length of exposed slope. Grass seeding and fertilizing the area further provides soil cover and provides some organic matter for soil rehabilitation

Factors affecting the landslide rate in future harvest units include the amount of timber harvest on steep slopes and the amount of soil disturbance in harvest units. Less soil disturbance in a harvest unit results in less disruption of the root mat and subsequently more root strength than if the root mat (soils) is disturbed (Swanston, 1974a). Implementing log suspension requirements has reduced the amount of soil disturbance in harvest units. Partial harvest would be used in all harvest units in Alternatives C and D and 205 acres of harvest in Alternative B and would further help maintain the root mat in harvest units.

The landslide analysis assumes that one landslide would occur in the next 20 years for each 622 acres of timber harvest. The average size of the second-growth landslides is 0.6 acres. The analysis also assumes that one 3.1 acre landslide would occur in the next 20 years for each 6,239 acres of old-growth. All assumptions are based on data from Landwehr (1998 unpublished)

There are currently 14 acres of second-growth in the Emerald Bay Project Area. If alternative A is implemented landslides in old-growth are still predicted to occur. Table Soils-4 displays estimated acres of landslides in the first 20 years following project implementation.

Table Soils-4
Estimated Acres of Landslides by Alternative per 20-year Time Period.

Alternative	Acres of Old-growth Landslides	Acres of Second-growth Landslides	Acres of Road-related Landslides	Total
A	2.6	0.0	0.0	2.6
B	2.3	0.7	0.2	3.2
C	2.2	0.7	0.0	2.9
D	2.2	0.7	0.1	3.0

Source: Forest Service, D.Landwehr

The landslide information indicates that similar acres of landslides would result from implementation of alternative A, B, C or D. This is due, in part, to the large scale of the landslide frequency information when compared to the relatively small scale of the timber harvest proposed in the Emerald Bay Project. More landslides would occur in second-growth, however due to their smaller average size, the difference in total acres between alternatives is slight.

Cumulative effects

The off site effects of soil erosion from roads, soil displacements, and landslides are not easily quantifiable and no watershed wide quantification of sediment and its effects on fisheries resources has been completed on the Emerald Bay Project area. A sediment risk analysis (Geier 1998) has been completed on each watershed in the Emerald Bay Project Area. The sediment risk analysis includes several factors pertinent to sediment production and routing of sediment in a watershed. The Watershed Analysis and aquatic resources section used the sediment risk analysis information, air photo interpretation, and ground reconnaissance to evaluate the potential effects of timber harvest activities in the watershed. BMPs are intended to keep surface erosion to a minimum practicable amount. Soil resource protection prescriptions, landslide mitigation measures and BMPs are listed on unit and road cards.

Reasonably Foreseeable Future Actions

An analysis of cumulative effects must also include "reasonably foreseeable future actions" (40 CFR 1508.7). For the Emerald Bay project action alternatives, harvest is likely to occur by 2008. Other harvest is planned on National Forest System land to the north of the Emerald Bay project. These projects are addressed in the Introduction to this chapter.

Mitigation and Monitoring

Soil resource protection prescriptions, landslide mitigation measures, and applicable Best Management Practices (BMPs) are listed on the road and unit cards. Due to the relatively thick organic mat covering most mineral soils, surface erosion is limited to displaced areas, roads, stream banks and recent landslide tracks. Displaced areas within timber harvest units are routinely slashed and seeded shortly after they occur. Slashing the disturbed site provides soil cover, reducing the force of raindrop impact and the length of exposed slope. Grass seeding and fertilizing the area further provides soil cover and provides some organic matter for soil revegetation. Other BMPs are intended to keep surface erosion to a minimum practicable amount.

Subsistence

The following discussions and analysis are based on the detailed subsistence information and analysis contained in the Forest Plan FEIS, Chapter 3: "Subsistence" and "Communities," Appendix H, and the "Deer Harvest Map" in the map packet. See also the Wildlife section of this chapter for additional analysis of deer and other wildlife species.

Affected Environment

Subsistence and ANILCA

Subsistence is a broad term applied to many natural resource uses of rural Alaskans. In the Alaska National Interest Lands Conservation Act (ANILCA), subsistence is defined (in part) as: "the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation" (ANILCA Sec. 803). ANILCA provides for the continuation of these uses "consistent with sound management principles, and the conservation of healthy populations of fish and wildlife" (ANILCA, Sec. 802). For many rural Alaskans subsistence is a way of life; for many rural Alaskans it also carries heritage and religious meaning.

The analysis of subsistence uses and resources on National Forest System lands, and of potential effects resulting from management activities, is also required by ANILCA (Sec. 810). This analysis typically focuses on food-related resources, which are the ones more likely to be affected due to loss or alteration of habitats from land-altering activities. (The identification, protection and interpretation of heritage and historic resources on Federal lands are covered under other legislation, including the National Historic Preservation Act. See the Other Resources and Heritage sections of this chapter.) The analysis also typically focuses on three factors: abundance and distribution of the resources, access to them, and competition for the use of them. Under ANILCA, if it is found that a significant restriction on subsistence resources may occur (from a specific project or cumulatively for a geographic area), additional analysis and findings are required.

Subsistence Resources and Uses

The Forest Plan FEIS provides a comprehensive analysis of subsistence resources and potential effects, both Tongass-wide and for each rural community of Southeast Alaska. That analysis concluded that Forest-wide, under full implementation of the Forest Plan, the only subsistence resource that may, in the future, be significantly restricted is subsistence use of deer (Forest Plan FEIS, pp. 3-224 to 3-229). The following is tiered to this analysis.

Salmon and trout are the principal subsistence fish resources of the area. They may be harvested in both fresh and saltwater in the project area with a State of Alaska fishing license. Alaska Department of Fish and Game does not grant personal use permits for Emerald Creek. Use of salmon and trout in the project area is minor. The principal subsistence wildlife resources of the project area are probably deer and smaller furbearers such as marten. Except for deer, use of wildlife species for subsistence purposes is relatively minor. (Forest-wide, measured by weight, deer account for 21 percent of subsistence food resources, and all other land mammals 4 percent (Forest Plan FEIS, p. 3-224).) Potential effects to any of these fish and wildlife species as subsistence resources are discussed under "Environmental Consequences" below. Other subsistence uses of natural resources may occur. Some examples are cedar bark gathering, berry picking, mushroom gathering, use of native plants for arts and crafts, use of bays and estuaries for shrimp and crab, and collection of other edible plants and animals. Most of these activities are associated with a particular traditional site. These sites vary in location and are not accurately mapped. The Emerald Bay project could affect these sites if any fall inside proposed units.

Community use of deer for subsistence purposes is well documented and studied for the rural communities of Southeast Alaska (see Forest Plan FEIS, pp. 3-210 to 3-223 and 3-523 to 3-528). Community use of specific geographic areas for obtaining deer is estimated by the wildlife analysis areas (WAAs) used by the State of Alaska. For the purposes of the wildlife analysis of the Emerald Bay alternatives, WAA 1817 would be used to represent harvest patterns for the project area (the Emerald Bay project area actually corresponds to 10 percent of this WAA).

Community use of each WAA for deer is displayed on the "Community Deer Harvest" map included with the Forest Plan FEIS (map packet). The map shows that from 1987-1994, the average reported annual harvest in WAA 1817 was 24 deer. Three communities (or community groupings) were responsible for the entire reported harvest of deer in WAA 1817: Ketchikan, Wrangell, and Meyers Chuck. Ketchikan is considered a non-rural community and the residents do not have a subsistence priority under ANILCA. Under ANILCA a priority for use would be granted to rural users if restrictions on use of a resource were necessary. If further restrictions on a use were necessary, that is the point at which a significant restriction on subsistence uses may occur. Such a restriction could occur from either reduced abundance or increased competition.

Community use is further discussed and displayed in the Forest Plan FEIS in the "Communities" portion of Chapter 3 (pp. 3-523 to 3-685) and in Appendix H. Of the communities listed above, Ketchikan residents harvested 71 percent of the deer from WAA 1817 between 1987-1995, Wrangell harvested 17 percent and Meyers Chuck harvested 12 percent.

Forest Plan FEIS Appendix H identifies for each community those WAAs accounting for 75 percent of that community's deer harvest. WAA 1817 represents a substantial portion of the total deer harvest for Meyers Chuck (17 percent). Although hunters from Wrangell harvest a greater number of deer from WAA 1817, this harvest constitutes only 1 percent of the total Wrangell harvest.

Environmental Consequences

The analysis of effects is based on the ANILCA categories previously mentioned: abundance and distribution, access, and competition.

Access

A slight increase in access to the project area for subsistence use is anticipated. The project area and the entire WAA are accessible by boat or float plane. The project area is 12 air miles from Meyers Chuck, 35 air miles from Wrangell, and 40 air miles from Ketchikan. Logging traffic would increase while the road is open for the sale. Foot travel would be enhanced both during the sale and after the road is closed at sale termination. However, it is not anticipated that use would increase substantially over current levels.

Abundance and Distribution

With application of the Riparian Standards and Guidelines of the Forest Plan, no significant adverse effects on salmon or trout species are anticipated under any alternative (see Fish section of this chapter). No significant adverse effects are anticipated for wildlife species, including deer (see Wildlife section of this chapter) for the following reasons:

1. Only about 8 percent of the project area (1 percent of the WAA) would be harvested.
2. Most (67 percent) of the project area and all of the lowest elevations have been designated as a medium OGR.
3. Forest Plan Standards and Guidelines would be implemented.

Models predict a decline in deer habitat capability of 1 percent under any action alternative. (Details of the analysis of deer habitat effects can be found in the Wildlife section of this chapter.) These declines would occur with the harvest of old-growth timber. This project would impact 5-10 percent of the low elevation (less than 1,200 feet above sea level) old growth in the project area. Implementation under the Forest Plan would require 1,000-foot beach and estuary fringe no-harvest zones along all saltwater beaches and estuaries, the application of riparian buffers along all streams, and the protection of 67 percent of the project area in Old-growth Habitat Reserves. All these result in considerable protection of important deer winter habitat.

Competition

In addition to these measures minimizing loss of key deer winter habitat in the project area, deer habitat decline must also be put in the perspective of subsistence use of deer in the area. As discussed under Affected Environment above, only one rural Southeast Alaska community, Meyers Chuck, relies heavily on subsistence deer harvest in WAA 1817 for a substantial portion (17 percent) of its subsistence food needs. There are several reasons to suspect that this project would have a small, if any, effect on subsistence use of deer: 1) the planned units are 1 mile or more from the beach, 2) the project area is only 10 percent of WAA 1817, 3) the project area is the portion of WAA 1817 farthest from Meyers Chuck, and 4) field visits suggest that deer numbers are higher at Union Bay and Vixen Inlet, which are also closer to Meyers Chuck.

Historic numbers of deer harvested, and potential direct and cumulative effects of full implementation of the Forest Plan in conjunction with the anticipated future demands for deer, are displayed and discussed for each Southeast Alaska community in the Forest Plan FEIS (Forest Plan FEIS, Appendix H).

In order for an area (in this case a WAA) to produce, on the average, enough deer for species viability, as prey for other wildlife species (primarily wolf), and for human uses (subsistence and other hunting), deer harvest by humans should not exceed a certain average percentage of the habitat capability for that area. The Forest Plan FEIS analysis makes two assumptions in this regard (p. 3-611):

- Hunters in areas where harvest or demand is within 10-20 percent of habitat capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.
- In areas where demand (or current/historic use) exceeds 20 percent of habitat capability, deer harvest may be restricted either directly or indirectly.

Indirect and Cumulative Effects

The analysis for Meyers Chuck (Forest Plan FEIS, pp. 3-608 to 3-5611, and H-81) shows that current (historic) use of WAA 1817 for Meyers Chuck alone is 0.2 percent of habitat capability, and for all rural users 0.4 percent. By the year 2005 (assuming full Forest Plan timber harvest, including the Emerald Bay project), with habitat capability down slightly and demand up slightly, use by Meyers Chuck residents is at 0.3 percent of habitat capability, and by all rural users 0.5 percent. Thus for short-term cumulative effects (the Emerald Bay project and all past projects), no restrictions on use by subsistence hunters would occur. (Demand including all hunters, rural, non-rural, and nonresident, is at 1.6 percent in 2005.)

After 100 years of full implementation of the Forest Plan (long-term cumulative effects), demand by Meyers Chuck residents is projected to reach 0.4 percent of habitat capability, and by all rural users of the area to reach 1.0 percent. Demand by all hunters is projected to be at 3.2 percent. Based on the preceding analysis, the Emerald Bay project would not pose a significant possibility of a significant restriction on any subsistence resource within the project area, from past, current and reasonably foreseeable future actions.

Reasonably Foreseeable Future Actions

An analysis of cumulative effects must also include "reasonably foreseeable future actions" (40 CFR 1508.7). For the Emerald Bay project action alternatives, harvest is scheduled to occur by 2008.

Other projects are planned on National Forest System land in the vicinity of the Emerald Bay project. These projects are addressed in the Introduction to this chapter.

Threatened, Endangered and Sensitive Species

A Biological Assessment (BA), which documents whether the proposed action is likely to affect an endangered, threatened, or proposed species, and a Biological Evaluation (BE), which documents whether the proposed action is likely to affect and endangered, threatened, or proposed species are in Appendix C. Direction for threatened, endangered and sensitive species is contained in the Forest Plan, Chapter 4.

Affected Environment

Threatened or Endangered Species

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS), under the authority of the Endangered Species Act of 1973, as amended. There are also other species for which concern regarding viability has been expressed (some of these were previously listed as USFWS Species of Concern or Category 2 candidate species when there was information indicating the species might qualify for threatened or endangered status, but for which further evaluation was needed). The State of Alaska has an Endangered Species law, which authorizes the Commissioner of the Alaska Department of Fish and Game (ADF&G) to list Alaska endangered species. The Regional Forester can also designate species occurring in national forests as "Sensitive."

No threatened, endangered, or proposed fish species are found in the freshwater river systems in the project area. Ten threatened species of salmon and three endangered species of fish may be present in the general vicinity in saltwater during the marine rearing period of their life cycle. However, the presence of these Pacific Northwest salmon is not documented for these waters. Sensitive plant surveys were done initially in 1998, with additional surveys in the summer of 2003. No threatened, endangered, or proposed plant species are known to occur in the project area.

Biological Assessments have been prepared to evaluate the effects of the Proposed Action on one federally listed threatened and two endangered species of marine animals (Table TES-1). Additional surveys were conducted in 2003 and the BA/BE was updated. These species are discussed below, based on the information in these assessments. No other threatened, endangered, or proposed birds or mammals are known to occur in the project area.

Leatherback sea turtles may occur infrequently in off-shore waters. Kittlitz's murrelet, a candidate species that has been proposed for listing, is found in more northern glacially-affected habitats, such as Glacier Bay and Tracy Arm. There is no suitable habitat on the Cleveland Peninsula or on the Ketchikan/Misty Fiords Ranger District. The District is outside the suspected range of Kittlitz's murrelet (Brockmann, S., pers. comm.). See the Biological Assessment for more information on these species.

The NMFS lists several species of whales and salmon as threatened or endangered for the waters around Alaska, however, most of these do not occur in the waters adjacent to the Tongass NF. See the BA/BE for more information.

Table TES-1
Threatened and Endangered Species That May Occur In or Near the Emerald Bay Project Area

Common Name	Scientific Name	ESA Status
Humpback whale	*Megaptera novaeangliae*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Steller sea lion	*Eumetopias jubatus*	Threatened

Source: see BE/BA in Appendix B

Humpback Whale

Humpback whales *(Megaptera novaeangliae)* are occasionally found in waters bordering the project area. The local distribution of humpbacks (listed by NMFS as Endangered) in Southeast Alaska appears to be correlated with the density and seasonal availability of prey, particularly herring *(Clupea harengus)* and euphausiids (shrimp-like crustaceans). Important feeding areas include Glacier Bay and adjacent portions of Icy Strait, Stephens Passage/Frederick Sound, Seymour Canal, and Sitka Sound. Other areas of Southeast Alaska may also be important for humpbacks and need to be evaluated. None of these are within or adjacent to the project area.

Steller Sea Lion

Steller sea lions *(Eumetopias jubata)* are also occasionally found in waters bordering the project area. The Steller sea lion (listed by NMFS as Threatened) ranges from Hokkaido, Japan, through the Kuril Islands and Okhotsk Sea, Aleutian Islands and central Bering Sea, the Gulf of Alaska, Southeast Alaska, and south to central California. Information on Steller sea lion population trends in Southeast Alaska is limited, but suggests that Steller sea lion populations are stable or increasing in Southeast Alaska. Adult Steller sea lion populations in Southeast Alaska increased about 30 percent between 1979 and 2000, based on uncorrected counts at rookeries. The closest rookery is on Forrester Island, west of Prince of Wales Island (over 100 air miles away). There are no known Steller sea lion haulouts in the project area; the closest is located on Easterly Island about 1.5 miles to the west. Monitoring of another sea lion haulout for recreation effects found that most boats maintained at least 100-yard distance, and those that didn't rarely caused a reaction by the sea lions (Tongass Monitoring and Evaluation Report 2001).

Leatherback Sea Turtles

The leatherback sea turtle *(Dermochelys coriacea)* uses open seas, bays and estuaries. It has the most extensive range of any reptile; in the western hemisphere populations are found from Nova Scotia south to Puerto Rico and the US Virgin Islands, Mexico and northern South America. They are also commonly seen in Hawaiian offshore waters and occasionally sighted as far north as Newfoundland, British Columbia and Alaska. Overall nesting trends in the US are stable; only minor nesting occurs in the US, mainly in Florida. Threats have been identified as beach front development, disturbance, commercial fisheries entanglements, harvest of eggs and adults, and marine pollution, especially plastics and oil spills. None of these factors are regulated by or within the jurisdiction of the Forest Service.

Sensitive Species

There were 4 sensitive wildlife and 3 fish species analyzed in the Biological Evaluation (USDA 1/6/00). In addition, there were 11 sensitive plant species analyzed (USDA 6/02). Additional plant surveys were conducted in 2003 and the BA/BE was updated. Those species with a determination of "no effect" are not discussed here; see the Biological Evaluation for information on those species.

Trumpeter Swan

The trumpeter swan *(Cygnus buccinator)* is the largest waterfowl species in the world. Its present range is only a vestige of the once vast region of North America that it frequented in both summer and winter. Trumpeter swans breeding in Alaska spend the winter along the Pacific Coast from the Alaska Peninsula to the mouth of the Columbia River, where they take advantage of open waters of saltwater estuaries and freshwater lakes and rivers. Trumpeter swans may be present in the project area during the fall, early spring migration period, and winter, although there appears to be little swan habitat in the project area. Swans typically leave for their breeding area by mid-April. Swans have not been reported in or near the project area during the summer.

Queen Charlotte Goshawk

The Queen Charlotte goshawk *(Accipiter gentilis laingi)* is a raven-sized raptor associated with forests having tall trees and dense canopies. These features allow goshawks to hunt beneath the tree canopy, and to capture prey before the prey escapes into the trees or shrub layer. The dense canopy in tall trees fosters a more abundant prey species population and provides a microclimate suitable for nesting. Goshawks forage over home ranges that are typically 6,000 to 8,000 acres in Southeast Alaska, though home range may be twice that size in fragmented forests. Iverson et al (1996) noted that they used moderate and high volume POG, riparian, and beach buffers more than would be predicted, based on availability of those types.

The northern goshawk has been a species of concern for all of its range, including the Queen Charlotte subspecies, which is present in Southeast Alaska. Following a petition for listing, and appeal of an initial not-warranted determination, the USFWS issued a 1997 decision that listing the species as threatened or endangered at that time was not warranted. The petitioners have again filed suit and a court has directed the USFWS to reconsider their determination.

Goshawk surveys were completed in 15 potential habitat locations in the Emerald Bay project area in April and July of 1998. Surveys followed Tongass NF protocols for the northern goshawk. Ten broadcast survey points (11.9 hours) and 5 overlook survey points (6.2 hours) were completed. Goshawk survey crews and other field crews observed no goshawks and found no goshawk nests.

Davy Mannagrass

Davy mannagrass *(Glyceria leptoctachya)* is distributed from Southeast Alaska to central California. In Southeast Alaska it is known from only two locations, near Wrangell and on Prince of Wales Island. However, it is easily overlooked and likely to be more widespread in Southeast Alaska. Based upon the botanical survey, no known populations occur in the project area. It grows in shallow fresh water and along stream and lake margins.

Wright Filmy Fern

Wright filmy fern *(Hymenophyllum wrightii)* occurs in coastal areas of Southeast Alaska and British Columbia. Three known locations are documented in Alaska, and are limited to Biorka and Mitkof Islands. It is unknown if the species occurs in the project area. This species appears to prefer humid shaded boulders, cliffs, tree trunks, and damp woods.

Calder's Lovage

Calder's lovage *(Ligusticum claderi)* occurs in British Columbia, Southeast Alaska, and South-central Alaska. Documented occurrences in Alaska are limited to two areas on Kodiak Island and Dall Island in Pleistocene refugia on limestone substrate. It is unknown if this species occurs in the project area. Calder's lovage occurs on open boggy or rocky slopes, and edges of coniferous forests. In Alaska it is known from subalpine meadow habitats and edges of mixed-conifer forest.

Bog Orchid

This species of bog orchid *(Platanthera gracilis)* is limited to a small geographic range in southern most Southeast Alaska and adjacent British Columbia. Two documented locations are

near Pearse Canal and on Dall Island. It is unknown if this species occurs in the project areas. This plant occurs in wet open-meadow habitat.

Loose-flowered Bluegrass

The distribution of this grass species *(Poa laxiflora)* is scattered between Southeast Alaska and Oregon. Seven occurrences have been documented in Southeast Alaska, near Hoonah, Sandborn Canal at Port Houghton, and Admiralty Island. It is not known if the species occurs in the project area. This species is associated with moist, open lowland woods and open-forest meadows.

Unalaska Mist-maid

The project area is within the known or suspected distribution of this species *(Romanzoffia unalaschcensis).* This species is found on rock outcrops, streambanks, and forest edges.

Queen Charlotte Butterweed

This species of butterweed *(Senecio moresbiensis)* is limited to Queen Charlotte Islands of B.C. and to disjunct populations in Southeast Alaska, including Prince of Wales, Coronation, and Dall Islands. This species occurs in; shady wet areas and bogs of montane to alpine habitats; open boggy or rocky slopes; and open rocky heath or grass communities.

Species of Interest

Choris Bog Orchid

In Alaska, the Choris bog orchid (*Platanthera chorisiana*) is limited to the Aleutian Islands and southern coastal areas. Recent botanical surveys on Revillagigedo Island have revealed a number of populations of this species. With the increasing number of observations, it seems that this species is not as rare as previously thought. This species was removed from the sensitive list in May 1999 following publication of the Draft EIS. Botanical surveys in 1998 discovered populations of the plant in Units 3 and 12.

Environmental Consequences

The following analysis includes discussions of the relevant mitigation measures from the Forest Plan. An additional mitigation discussion at the end of this section, as is included in most other Chapter 3 sections, is therefore not included.

Effects on Threatened or Endangered Species

None of the alternatives are anticipated to adversely affect the humpback whale or Steller sea lion. There would be no effect on leatherback sea turtles, as they rarely enter marine waters of the Inside Passage. The Biological Assessment for each species is included in Appendix B, and the effects analysis for each are summarized below.

Humpback Whale

No direct effects on whales are anticipated from implementation of forest management activities under any alternative. Forest Plan Forest-wide Standards and Guidelines for Threatened and Endangered species provide for the protection and maintenance of whale habitats. All activities would be conducted in a manner consistent with the Marine Mammal Protection Act, the Endangered Species Act, and National Marine Fisheries Service regulations for approaching whales, dolphins, and porpoise.

One potential indirect effect has to do with the use of log transfer facilities (LTFs). Logs harvested from the Emerald Bay project would be loaded onto barges at an LTF in Alternative B and D. Two types of boat activity associated with LTFs, towing and recreational boating by workers, may have an effect on whales. Towing routes are generally well established, and adverse effects from towing have not been documented. In addition, euphausiids (prey) may be sensitive to leachates produced from bark sloughing deposited in the water. Since this is a barge LTF, it should have less effect on the marine environment than other LTFs, since the logs would not be rafted directly in the water. No adverse effects on whales are anticipated.

Steller Sea Lion

Forest Plan Standards and Guidelines provide for the protection and maintenance of sea lion habitats. All activities would be conducted in a manner consistent with the Marine Mammal Protection Act, the Endangered Species Act, and National Marine Fisheries Service regulations for approaching seals and sea lions. After consultation with the National Marine Fisheries Service, additional procedures to prevent disturbance of the Easterly Island haulout would be required for the Emerald Bay project. These additional procedures were added because during lower tides the haulout has relatively abrupt dropoffs that could be hazardous to sea lions. Project-associated boats would be required to remain at least 200 yards from the haulout. Project-associated aircraft would be required to remain at least 0.5 miles horizontal and 1500 feet vertical distance from the haulout. The Emerald Bay project should have no adverse effects on Steller sea lions or on their critical habitat.

Cumulative Effects

There are no future State, tribal, local, or private actions of similar nature planned to occur within VCU 7210 or WAA 1817. Cumulative effects, as defined by ESA section 7 are not anticipated.

Effects on Sensitive Species

The information below is summarized from the Biological Evaluation. See that document for more information and determination.

Trumpeter Swan

All Forest Plan Standards and Guidelines for trumpeter swans are incorporated. These direct avoiding any disturbance of trumpeter swans, particularly during nesting, brood rearing, and wintering periods. If trumpeter swans are found to be using habitat within the project area, road building and timber harvesting would not occur within 0.5 miles of used habitat when swans are present (normally from November 1 to April 1). Project activities are expected to occur between April 15 and October 31, so there is not much potential for disturbance.

Queen Charlotte Goshawk

All action alternatives would harvest stands capable of providing nesting and/or foraging habitat for goshawks (i.e., old-growth forests). All action alternatives would reduce old-growth forest in the project area by about 11 percent from existing conditions (see Table Old Growth-4). Any clearcut units with high-value marten habitat would maintain 10-20 percent canopy cover under Forest Plan Standards and Guidelines for marten. In contrast to traditional clearcut harvesting, this increase in standing trees left within the units should result in better maintaining goshawk habitat conditions. Partial cut units would likely leave about 50 percent of the trees and/or 50 percent of the basal area. It is not known what the actual effects of timber harvest would be, other than that the total amount of undisturbed old-growth habitat would be reduced. Alternative B would remove the most canopy cover: 396 acres of clearcut harvest and 205 acres of partial harvest. Alternatives C and D would partial harvest 620 acres with a target of leaving 50 percent of the trees and/or 50 percent of the basal area.

Table TES-2
Goshawk Habitat in VCU 7210 (Moderate to High Volume POG less than 800 feet elevation)

	Alt A	Alt B	Alt C	Alt D
Acres	1,859 acres	1,617	1,601	1,601
Percent of area	24%	21%	20%	20%

Source: FS GIS Vol Strata

While Alternatives B and D would construct a road through the beach buffer, this area is low volume old growth. There is moderate volume old growth that is more suitable for nesting, to the north and east of the road.

Iverson et al (1996) state that uneven-aged silvilculture that emulates natural disturbance patterns will have a high likelihood of sustaining goshawk habitat. In addition, a combination of reserve-based and dynamic landscape management (single-tree and group selection) increases the likelihood of sustaining a well-distributed viable population.

There are no confirmed goshawk nesting sites in or near the Emerald Bay project area. However, goshawks are extremely difficult to locate and it is possible that the project area includes one or more breeding territories. Any goshawk nests found during field reconnaissance or unit layout would be protected from harvest by implementing Forest Plan Standards and Guidelines for goshawks. These require the maintenance of an area of not less than 100 acres of productive old-growth forest (if it exists) generally centered over the nest tree or probable nest site, preferably with a multi-layered, closed canopy and providing foraging opportunities for young goshawks. No commercial timber harvest is permitted, and no continuous disturbance likely to result in nest abandonment is permitted within the surrounding 600 feet from March 15 to August 15. Activity restrictions are removed for active nests that become inactive or are unsuccessful.

Davy Mannagrass
No known populations occur in the project area. It grows in shallow fresh water and along stream and lake margins. The Forest Plan Standards and Guidelines protect most of its habitat from disturbance, though smaller streams may not receive buffers. Therefore, timber-harvest activities may affect undetected individuals.

Wright Filmy Fern
No observations have been documented in the project area. Undetected individuals could be affected.

Calder's Lovage
No observations of this species have been documented in the project area, although undetected plants could be affected by timber harvest activities at forest edges.

Bog Orchid
No observations were made during field surveys. Because this plant occurs in wet open-meadow habitat and not in forested area, effects would be limited to suitable habitats within the road right-of-way.

Loose-flowered Bluegrass
While not documented, undetected plants could be affected by timber harvest activities.

Unalaska Mist-maid
This species was not found during project level surveys, but individuals could be found in the area. Plants on rock outcrops and along stream banks would not be affected by this project (due to location and riparian buffers). Individual plants could be found on forest edges and could be potentially affected by the proposed road location.

Queen Charlotte Butterweed
Open habitats are generally avoided by timber harvest, but there could be effects on undetected plants adjacent to harvest units or along the road location.

Cumulative effects
The cumulative effects analysis area for these sensitive species is Wildlife Analysis Area 1817. The only harvest that has occurred in the past was 14 acres of selective harvest along the beach in the 1930's. The Emerald Bay timber sale is scheduled for sale in 2005. Within the WAA, there are no other scheduled harvests planned on the FY03-12 Timber Sale Plan. The Emerald Bay Roads Analysis map shows a projected road system from south of Port Stewart and west to south of Vixen inlet (VCU's 7180 and 7200). However, as this is not on the 10-year plan, it is too speculative to assess effects. Because there are no anticipated projects in the foreseeable future, this project would not contribute cumulative effects. Table TES-3 shows the percent of

the cumulative effects analysis area currently in productive old growth and after implementation of the proposed alternatives. These areas provide habitat for species such as Queen Charlotte Goshawk, Wright Filmy Fern, and Loose-flowered Bluegrass and show a decrease of 1 percent across the WAA for the foreseeable future.

Table TES-3
WAA 1817 Productive Old Growth Before and After Harvest

Alternative	Acres POG	Percent of WAA 1817 in POG	Acres of harvest POG
A	35,336	55%	0
B	34,817	54%	519
C	34,803	54%	533[1]
D	34,803	54%	533[1]

[1] These acres would have legacy trees left but would not be in high volume POG following harvest

Effects on Species of Interest

Choris Bog Orchid

Botanical surveys discovered populations of this plant in Units 3 and 12. Choris bog orchid appears to be well distributed in the project area, so more populations may be discovered. Therefore the project may affect Choris bog orchid; however, due to the number of known populations, the project is not likely to disrupt the general distribution of the species.

Mitigation and Monitoring

In the event that any TES species is found during layout, the applicable standards and guidelines would be applied.

To prevent disturbance to sea lions, project-associated boats would be required to remain at least 200 yards from the haulout on Easterly Island. Project-associated aircraft would be required to remain at least 0.5 miles horizontal and 1500 feet vertical distance from the haulout.

Transportation

Affected Environment

Forest Road System

Access to Cleveland Peninsula and the Emerald Bay project area is by float-plane, helicopter and boat. There are no roads in this area.

National Forest System Roads are classified based on current or anticipated use into one of two maintenance levels. Roads may also be obliterated or otherwise returned to an unroaded condition after use. Maintenance levels incorporate traffic service levels, as indicated in the following definitions. Applicable maintenance levels for the project area are:

- Maintenance Level 1 (Traffic Service Level D) - Roads are closed by bridge removal or organic encroachment and are monitored for resource protection. Basic custodial maintenance is performed to perpetuate the road and to facilitate future management activities.
- Maintenance Level 2 (Traffic Service Level C) - Roads are maintained for high-clearance vehicles and monitored for resource protection. Traffic would be minor, consisting of administrative uses.

Environmental Consequences

Road Development

The effects of the transportation system on other resources are considered in the specific resource sections (Fisheries, Socioeconomics, Soils, Subsistence, Water, and Wildlife). This section focuses on the effects of each alternative on the transportation system, and discusses post-project access management. The Emerald Bay project does not include a proposal for or analysis of a State road corridor or any other transportation or utility system project within the Transportation/Utility System Land Use Designation.

Table Transportation-1 displays the miles of new roads by alternative. There would be no road construction in Alternatives A and C. Road construction in Alternative B consists of approximately 6.2 miles of low-impact road from a new log transfer facility located in the Emerald Bay area. Alternative D would build 3.8 miles of low-impact road and one land-to-barge log transfer facility.

Roads in Alternatives B and D would be constructed to minimize impacts. Road width would be 14 feet; the surface would be outsloped, with no ditch except in turnpike areas. Log-stringer bridges would cross drainages, and culverts would only be used for crossdrain areas. Road construction would include three 1/5 acre rock pits.

The log transfer facility (LTF) site at Emerald Bay would be used to implement the Emerald Bay timber sale under Alternatives B and D. Further discussion on LTFs can be found in the Marine section.

Table Transportation-1
Miles and Cost of New Road by Alternative

	Alt. A		Alt. B		Alt. C		Alt. D	
	Miles	Cost MM$	Miles	Cost MM$	Miles	Cost MM$	Miles	Cost MM$
System Roads	0	0	6.2	1.11	0	0	3.8	.58

Source: Forest Service, GIS

Access Management

After the completion of harvest activities, roads are managed as necessary to control the type of use and kind of traffic. This is called access management. Road access is managed to prevent damage to the roadway, and to meet objectives for resources such as fish, water quality and wildlife, while maintaining public uses and access for timber management and related activities.

Post-harvest traffic strategies would be to "eliminate" road use. Measures would be put in place to prohibit ATV access, including: stormproofing (20 waterbars per mile has been proven to effectively deter ATV use), log-stringer bridge removal, obliteration of the road within sight of the beach, decommissioning of the LTF, and placement of large debris, such as rocks, root wads and stumps on the road surface. Placing roads in storage and removing all drainage structures equates to an Alaska Forest Resource Protection Regulation (AFRPR) status of "closure."

Indirect and Cumulative Effects

The roads in Alternatives B and D would provide access to over 600 acres for timber harvest and log transport during the period of the timber sale contract. No roads would be constructed in Alternatives A and C; there would be no road access. Once harvest is completed and the roads closed, they would no longer provide vehicle access, however they would facilitate access by foot, and the closed roads could be re-opened for future timber harvest.

The economics of the access provided through road construction are displayed in the socioeconomics section of this chapter.

The area analyzed for cumulative effects is VCU 7210 because the roads provide little or no access beyond the immediate vicinity of the road. There are no other roads within VCU 7210, so there are no cumulative effects in addition to the direct effects.

Reasonably Foreseeable Future Actions

An analysis of cumulative effects must also include "reasonably foreseeable future actions" (40 CFR 1508.7). There are no other reasonably foreseeable future actions within the VCU 7210.

Mitigations and Monitoring

Mitigation measures for forest resources applicable to road location, construction and/or design follow the requirements of the Forest Plan, the Best Management Practices, and other direction. Many of these are discussed under the specific resource sections of this chapter.

A major consideration for roads is the need for construction timing restrictions to minimize potential effects to young fish and fry. The Ketchikan-Misty Fiords Ranger District has developed several options to increase the length of the construction window, based on previous project experience. These include the installation of a log stringer bridge, which allows

equipment to cross a creek without any instream construction; for small, non-fishbearing streams, damming and diverting water around the site during culvert placement and rocking; and installing culverts or bridges during low flow periods or when streams are frozen. Forest Service, Fish and Wildlife Service and State biologists are consulted to determine appropriate options for each site.

Water

The following discussions and analysis are based on and summarized from the Soil, Floodplain, Riparian, and Wetland Resources Report for the Emerald Bay project (1999), and the Water and Fish Resource Report for the Emerald Bay project area (1999). A Forest-wide treatment of water resources may be found in the Forest Plan FEIS, Chapter 3. Applicable water quality direction is included in the Forest Plan, Chapter 4 ("Riparian" and "Soil and Water") and Appendices C, D and J. Additional mitigation measures are discussed in Chapter 2.

The water-related resources of the Emerald Bay project area include floodplains, riparian areas (including streams, lakes and ponds), and wetlands. The effects of past timber harvest activities on the Emerald Bay drainage are minimal. Additional analysis relative to riparian areas may be found in the Fisheries section of this chapter.

Affected Environment

Riparian Management Areas

Riparian areas are lands adjacent to streams, lakes and ponds that are either influenced by groundwater from the water body, or are lands that can directly influence the water quality of a water body when ground disturbing activities occur. Riparian areas can include both upland and wetland areas adjacent to water bodies or streams. Riparian areas also include floodplains and alluvial fans, and areas below the slope-break on V-notches or gorge channels.

Stream process groups are groups of streams that share similar formative processes and stream channel characteristics. Process groups reflect the long-term interaction of geology, landform, climate, and riparian vegetation. The Riparian Standards and Guidelines in the Forest Plan are specific to stream process groups.

Wetlands

Wetlands are defined as "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions" (40 CFR 230.41 (a)(1)). "Frequency and duration" of a groundwater table sufficient to support a prevalence of hydrophytic plants can include areas where the groundwater table is 12 inches below the soil surface for as little as 2 weeks during the growing season. In the Emerald Bay project area, many wetlands are not associated with streams or lakes and include no surface water areas, while others are intimately associated with lakes or ponds. Some wetlands are dependent on ponds and lakes for recharge water, while some are not.

The Emerald Bay project area covers 7,845 acres, of which approximately 71 percent, or 5,557 acres have been mapped as wetlands. Map interpretations include somewhat poorly drained soils on relatively steep slopes that do not always meet the hydrology criteria for classification as wetlands. Field reconnaissance indicated that this mapping overestimates the actual amount of forested wetlands on steeper slopes. The most common wetland types are forested wetlands (1,729 acres), a forested wetland/non-wetland complex (1,779 acres), a forested wetland/short sedge complex (1,346 acres), and alpine shrub/short sedge (244 acres). Past timber harvest has not occurred on wetlands in the project area.

Table Water-1
Acres of Wetlands by Wetland Habitat Type.

Wetland Habitat	Acres
Alpine Shrub/Short Sedge	244
Short Sedge Wetland	156
Lakes and Ponds[1]	71
Forested Wetland	1,729
Forested Wetland/Short Sedge Complex	1,346
Forested Wetland/Non-Wetland Complex	1,779
Forested Scrub-shrub/Short Sedge Wetlands	232
Total Wetlands	**5,557**
Forested Non-Wetlands	2,289
Total Acres[2]	**7,846**

[1]Lakes and ponds are considered deep-water habitats, but are shown here for display purposes.
[2]Totals may not match due to rounding.
Source: Forest Service, GIS

Wetland value (socioeconomic benefit) is largely dependent on the human use or perceived benefit to be derived from wetland functions (hydrologic, bio-chemical and biologic functions such as erosion control and sediment storage, element recycling and maintenance of water chemistry, and providing terrestrial and aquatic habitats).

The Emerald Bay project area was field reviewed for three high-value wetland habitat types: estuaries, tall sedge fens, and sphagnum bogs. Two of the three high-value wetland types occur on the Emerald Bay project area. There are approximately 16 acres of estuary at the mouth of Emerald Creek. Estuaries do not show up in Table Water-1 because the project area shoreline excludes the entire estuary. Estuaries are regionally recognized as the most important wetland type for the fisheries, wildlife and marine habitat they provide. Forest Plan Standards and Guidelines do not allow timber harvest within 1,000 feet of an estuary.

No tall sedge fens are mapped on the Emerald Bay project area. During project reconnaissance, a small tall sedge fen was identified adjacent to the main stem of Emerald Creek downslope of Unit 11. Tall sedge fens filter large amounts of groundwater and are usually found on the footslope or adjacent to floodplains. Tall sedge fens are included in the Riparian Standard and Guidelines buffer for floodplain process group channel types. The tall sedge fen would be excluded from harvest activity.

No sphagnum bogs are mapped on the Emerald Bay project area and none were identified during project reconnaissance. Sphagnum bogs are very poorly drained organic soils derived from a relatively undecomposed accumulation of sphagnum moss. Sphagnum bogs are extremely wet and often are associated with very small ponds of standing water. Sphagnum bogs are considered high-value wetlands because of their regional scarcity.

Environmental Consequences

Riparian Management Areas

The Forest Plan Standards and Guidelines for riparian areas generally exclude timber harvest from the riparian areas along all Class I, II and III streams (all fish streams and non-fish streams with immediate influence on fish streams). Class IV streams (streams that lack the ability to immediately influence downstream fish habitat and water quality) may be considered for timber harvest. Class IV streams within the project area occur in units receiving both clearcut and partial-cut harvest prescriptions. Specific riparian area protection measures and application of Best Management Practices (BMPs) are documented on the road and unit cards, and in the soil and fisheries resource reconnaissance reports, contained in the project planning record.

The potential for windthrow of trees left within harvest units and riparian areas is addressed in the silvicultural prescriptions on the unit cards. For all units that receive partial-cut harvest or extended windfirm buffers, it is anticipated that the residual trees left within harvest units would improve the windfirmness of trees left within Riparian Management Areas.

Wetlands

The high density of wetlands in the Emerald Bay project area makes complete avoidance of wetlands impossible while implementing any of the action alternatives. Many of the remaining forested wetlands on organic soils do not support commercial or economic stands of timber. During Emerald Bay project reconnaissance, proposed timber harvest on poorly drained organic soils was investigated on a case-by-case basis. Large areas of poorly drained organic soils were removed from proposed timber harvest units. Small areas of poorly drained organic soils were considered on a case-by-case basis, and removed from harvest units where appropriate. Of the rest of the forested wetlands, up to 614 acres are considered for timber harvest in the alternatives. The amounts actually proposed for the action alternatives are displayed in Table Water-2.

Harvesting timber from forested wetlands causes a temporary increase in soil moisture until equivalent transpiration and interception surfaces are reestablished. The partial-cut harvest proposed for all units would keep some of the evapotranspiration surfaces intact. Tree growth on forested wetland sites is expected to be slower than on adjacent upland sites.

Table Water-2
Acres of Proposed Harvest on Forested Wetlands by Wetland Habitat Type and Major Watershed by Alternative.

Wetland Habitat	Alternative B acres Clearcut	Alternative B acres Partial Cut	Alternative C & D acres Clearcut	Alternative C & D acres Partial Cut
Forested Wetland	142	14	0	161
Forested Wetland/Short Sedge Complex	35	11	0	49
Forested Wetland/Non-Wetland Complex	101	97	0	228
Forested Scrub-shrub/Short Sedge Wetland Complex	8	26	0	34
Total	**286**	**148**	**0**	**472**

Source: Forest Service, GIS

The frequency of wetlands within the project area also makes total avoidance of road construction in wetlands difficult or impossible under Alternatives B and D. Table Water-3 displays the miles and acreages of wetland road construction in Alternatives B and D. Roads through wetlands can affect the flow and reach of water in the wetland. The degree of impact depends largely on the wetland type and the road construction materials and methods. Placement of culverts and the use of coarse rock roads helps to maintain the flow and reach of water. Road location has avoided all high-value wetlands.

Table Water-3
Miles of Proposed Road on Wetlands for Alternatives B and D, and Acres Impacted

Wetland Habitat	Miles	Acres
Forested Wetland	1.4	6.8
Forested Wetland/Short Sedge Complex	2.0	9.7
Forested Wetland/Non-Wetland Complex	0.6	2.9
Total	**4.0**	**19.4**

Source: Forest Service, GIS

Chapter 2, General Mitigation Measures and Site Specific Mitigation Measures to be Incorporated Into Unit and Road Design, discusses specific wetland avoidance, minimization, and mitigation measures, as well as the wetland functions considered in the road location. Any roads constructed in the Emerald Bay project area would be closed after harvest is completed. The new road construction proposed under these alternatives meets the silvicultural exemption requirements of the Corps of Engineers 404 (b) (1) permitting process.

The floodplains of the Emerald Bay drainage would not be affected by planned harvest, and riparian areas would be excluded from timber harvest under Forest Plan Standards and Guidelines. The Emerald Bay drainage has the majority of the project area's high gradient contained streams, and blowdown could occur in up to 5 percent of the riparian areas of these streams adjacent to harvest units (see previous discussion of riparian area effects). Timber harvest on forested wetlands in the Emerald Bay drainage is proposed for all action alternatives. See Table Water-2.

Windthrow Potential in Riparian Areas

Timber harvest proposed under the three action alternatives would leave trees standing below the slope-break on streams within V-notches. To reduce the chance of windthrow, a variety of silvicultural prescriptions are used for stands adjacent to V-notches to better achieve windfirmness of the remaining trees. Partial-cut prescriptions would provide additional windfirmness. However, some windthrow is still likely within some of the riparian areas associated with the high-gradient contained streams. As a worst case, it is anticipated that blowdown could occur in up to 5 percent of riparian forests adjacent to high-gradient contained streams in the future if all suitable timber lands were clearcut, or along about 1.5 miles of streams.

Wetlands Function

The effects of timber harvest on the beneficial functions of forested wetlands are in most cases expected to be temporary, especially in the case of those harvested using uneven-aged management. Currently there are no roads across wetlands, and the Emerald Bay project could bring that total up to 6.2 miles (under Alternative B).

Indirect and Cumulative Effects

Since the only other ground-disturbing activities to date within the watersheds to which this effects analysis is contained was the selection harvest in the beach buffer which occurred sixty

years ago, and since no additional activities are expected to occur for at least 50 years, indirect and cumulative effects to the water resources are anticipated to be minimal.

Reasonably Foreseeable Future Actions

An analysis of cumulative effects must also include "reasonably foreseeable future actions" (40 CFR 1508.7). For the Emerald Bay project action alternatives, harvest is scheduled to occur by 2006.

Additional projects are scheduled in the vicinity or the Emerald Bay project area are discussed in the Introduction to this chapter.

Mitigation and Monitoring

Water-related (including riparian areas and wetlands) resource protection prescriptions and applicable BMPs are listed on the road and unit cards, and in the fisheries and soil resources reconnaissance reports (all contained in the project planning record). The Beach and Estuary Fringe, Riparian, Soil and Water, and Wetlands Standards and Guidelines of the Forest Plan all apply. The Region 10 Soil and Water Conservation Handbook includes all BMPs applicable in Alaska and provides additional direction for project implementation.

Wildlife

A related wildlife analysis is contained in the Forest Plan FEIS, Chapter 3 and Appendix N. Applicable wildlife direction is included in the Forest Plan, Chapters 3 (Land Use Designations) and 4 (Forest-wide Standards and Guidelines) and Appendix K. Mitigation measures listed on road and unit cards contain additional site-specific implementation requirements.

Affected Environment

The natural vegetation of the Emerald Bay project area is a mosaic of coniferous forest interspersed with alpine tundra, muskeg (bog), shrub land, estuarine, and beach fringe plant communities. A small portion (approximately 14 acres) of the Old-growth Habitat Reserve (OGR) near the estuary was harvested approximately 60 years ago. Single-tree beach harvest has historically taken place in the project area.

The availability and distribution of old-growth habitats can be assessed in two ways. Volume strata uses timber volume, soil and slope information as an indicator of productive forest habitat (see Table Wildlife-1).

Table Wildlife-1
Vegetation in the Project Area (VCU 7210). POG = productive old growth

	Acres	Percent of the Project Area
POG – high volume	2,347	30%
POG – medium volume	1,608	20%
POG – low volume	1,302	17%
Unproductive OG	2,404	31%

Source: Forest Service, GIS Vol strata. There is about 1% each of freshwater and non-forest

Structural mapping uses volume class and stand density as an indicator of canopy texture. Coarse canopy textured stands are associated with tall, large diameter trees on highly productive slopes with low to moderate canopy closure. Volume classes 6 and 7 are the current best available portrayal of coarse canopy stands (Puchlerz 2002)(see Table Wildlife-2).

Table Wildlife-2
Coarse Canopy Forested Habitat in the Project Area (VCU 7210)

	Acres	Percent of the Project Area
VC 6 and 7	597	8 %

Source: Forest Service, GIS Vol strata.

Management Indicator Species

Management Indicator Species (MIS) are species whose population changes are believed to best indicate the effects of land management activities (USDA Forest Service 1982). MIS are used to assess maintenance of population viability (the ability of a population to sustain itself naturally), biological diversity, and management of game (Forest Plan FEIS). There are several

MIS species that were not selected for analysis: river otter, Vancouver Canada goose, and black bear. They were not selected because Forest Plan Standards and Guidelines protect primary habitat and no harvest or road building is proposed in these habitats.

The following have been selected as MIS for this project and will be discussed in this chapter. This list also shows their relationship to old-growth habitats, if specific stand structures are required.

Species	Basis for Selection
Sitka black-tailed deer	Important subsistence, game species Low elevation old-growth
American marten	Old-growth habitat; important furbearer High volume, low elevation old-growth
Mountain goat	Associated with cliffs, alpine, supbalpine and old growth Old-growth with dense crown closure in winter
Brown bear	In late summer, riparian with anadromous fish
Bald eagle	Nest in old-growth along coast and riparian
Alexander Archipelgo wolf	Furbearer and game species Old-growth for denning
Brown creeper	Use large old-growth trees and snags High volume old-growth
Hairy woodpecker	Use large old-growth trees and snags High volume old-growth
Red squirrel	Use large old-growth trees and snags Cone bearing trees
Red-breasted sapsucker	Use large old-growth trees and snags Low volume old-growth

Although not a MIS, moose were brought up as a potential issue by DGC. They reported that there were two likely reports of moose tracks within Wasta Creek drainage (to the north of the project area). Moose would be considered unlikely to be present (only accidental or transient use from moose from the Unuk River drainage) and are not analyzed here.

Sitka Black-tailed Deer

The Sitka black-tailed deer was chosen as an MIS because it is an important game and subsistence species and is associated with old-growth forests. Research conducted in Southeast Alaska indicates that high-volume, mature forests at lower elevations are needed to sustain deer populations during severe winters (Schoen et al. 1985; Hanley and Rose 1987; Yeo and Peek 1992). Large, strong branches of mature stands intercept snow and maintain available forage. Productive, higher-volume stands of old-growth forests support the largest biomass of herb and shrub forage (Alaback 1982). Deer populations are impacted by the combination of deep-snow winters and large amounts of winter range converted to second growth. Snow reduces or eliminates forage availability in young clearcuts. Closed canopy young-growth stands provide little forage in all seasons.

The project area falls into State Game Management Unit (GMU) 1B. Hunters are each allowed two bucks in this area, with a season from August 1 to December 31. The yearly average harvest from 1997 to 2002 was 827 deer per year in GMU 1. The average reported annual harvest in WAA 1817 from 1987-1995 was 24 deer (Plan EIS map packet). Records indicate

that historic use of the project area for deer harvest has been low. See the Subsistence section of this chapter for additional information.

An interagency model (DeGaynor 1996) was developed to evaluate the potential quality of winter habitat for Sitka black-tailed deer. The model was developed as a tool to assess the effects of action alternatives compared to no action, and future habitat suitability and capability of the WAA. The model calculates habitat suitability indices based on timber volume strata, aspect, elevation, and typical snowfall. High volume POG with south aspects, below 1,500 feet elevation, and in low snowfall areas are assumed to provide the best deer winter range. The model was updated for the Forest Plan to use 125 deer per square mile as the multiplier. More recent information (Person et al, 1997) suggests that 100 deer per square mile would be more appropriate, and the model was run using this figure, as directed by the Forest Supervisor's August 6, 2002 letter. For the Emerald Bay project, predation was not included as a factor. In addition, the model assigned the same habitat capability scores to partially harvested units as it did clearcut units. This provides a conservative estimate of habitat capability since it seems likely that partially harvested units would have higher habitat values than clearcut units.

Based on the input, the model calculated the deer habitat capability for WAA to be 2,189 deer. Because there has been little human- or naturally induced large-scale disturbance, habitat capability for deer has probably remained about the same over the last 100 years.

Marten

The marten was selected as an MIS because of its association with old growth and because it is an important furbearer. According to reports from Alaska Department of Fish and Game, marten populations are considered moderate in the project area (D. Larsen pers. comm.). The Forest Plan FEIS (pgs. 3-354 and 360) identifies high-value marten habitat as high-volume, old-growth forest below 1,500 feet elevation. In addition, high volume old-growth in the coastal beach fringe and riparian areas have very high values. Cavities in large boles of trees and snags, hard downed logs, and beneath tree roots are most important for natal dens. The project area currently contains 2,084 acres of old-growth forest meeting the criteria for high-value marten habitat.

Marten are easily trapped and can be over-harvested, especially where trapping pressure is heavy and not effectively controlled. This corresponds closely to the availability of road access. Marten densities decrease (due to their susceptibility to over-trapping) when road densities exceed 0.2 miles of road per square mile, and marten densities would be reduced by as much as 90 percent when road densities approach 0.6 miles of road per square mile. There are currently no roads in the project area.

Currently, in GMU 1, the open trapping season is from December 1 to February 15 with no limit on the numbers harvested. Marten were reported to be the most important species for trapping (34 percent) in Southeast Alaska (Scott and Kephart 2002). Records indicate that historic use of the project area for marten harvest has been low. See the Subsistence section of this chapter for additional information.

An interagency model (Suring et al. 1992) was developed to evaluate and compare the potential quality of habitat for marten. The model calculates a habitat suitability index based on timber volume strata, elevation, and typical snowfall. The model was updated for the Forest Plan using 2.7 marten per square mile as the multiplier. The forest suitability layer has been updated to reflect field-verified suitability. The Emerald Bay project area currently has a habitat capability of 17.6. Because there has been little human- or naturally induced large-scale disturbance, habitat capability for marten has probably remained about the same over the last 100 years.

Brown Bear

The brown bear is associated with areas from sea level to alpine. The late-summer season, when bears concentrate along low-elevation valley bottoms and streams, has been identified as the most critical or limiting period. Estuaries and riparian areas with anadromous fish have the

highest habitat value. Buffers allow some isolation of bear feeding sites from humans and other bears. A 500-foot buffer on important foraging streams has been identified as an appropriate width.

Currently hunting regulations for brown bear in Unit 1 include a season from September 15 to December 31, with allowance for one bear every four regulatory years per hunter. The 5-year average harvest in GMU 1 is 38 bears per year (1997-2002).

Mountain Goat

The mountain goat is associated with cliffs, alpine, subalpine, and old-growth forested habitat. Winter habitat, consisting of old-growth trees with large, dense crowns to intercept snow and provide understory forage, is a limiting factor. The population of goats on Cleveland Peninsula consists of small groups of goats living in small patches of habitat. Females are non-migratory and the males make movements between groups (Smith and Raedeke, 1982). Other studies in 1982 (in Smith and Raedeke, 1982) found that the distance to cliffs (broken terrain with slopes greater than 50 percent) was the most important factor in determining goat use of the area. This portion of GMU 1B is closed to mountain goat hunting due to conservation concerns over population viability.

There are 1,956 acres of escape terrain within VCU 7210 (slopes >50 percent). This is about 25 percent of the project area. These areas, in combination with productive old growth stands within 1,300 feet of escape terrain, cover 4,768 acres, or about 61 percent of the VCU.

Bald Eagle

Southeast Alaska has the highest density of bald eagles in North America. In 1992 there were over 13,000 adult birds, and approximately 8,000 known nest sites. The bald eagle nests primarily in old-growth habitat along the coast and within riparian areas. Over 90 percent of the nests are within 500 feet of saltwater. There are three known bald eagle nest trees along Emerald Bay. Surveys in June 2000 found three nests located at or near Emerald Bay, and no nests were found immediately north of Emerald Bay (FWS 2000). Aerial surveys of the nests in summer of 2001 located two of the nests. They appeared dilapidated and not to have been active for several years (Spiering and Zelenak, 2001). The third nest was not located.

Alexander Archipelago Wolf

This species uses a variety of vegetative communities throughout the year that equates to habitat of prey species. They use old-growth for denning. The primary prey in Southeast Alaska is deer, but other ungulates, beaver, and salmon are also used. Studies of wolves on islands in Southeast Alaska have found that they consume an average of 26 deer per wolf per year. Hunting, trapping, and illegal killing accounts for a high percentage of the mortality in wolves. Mortality was correlated with the linear length of roads in WAAs (Person et al, 1996).

Wolves are classified as both big game and furbearers. In GMU 1 they may be trapped from November 10 to April 30, with no limits on numbers taken. They may be hunted under state regulations from September 1 to March 31 with a limit of 5 wolves per hunter. Rural residents can harvest wolves under Federal Subsistence regulations from August 1 to April 30. The 5-year average harvest in GMU 1 is 54 wolves per year.

Brown Creeper, Hairy Woodpecker, Red Squirrel, Red-breasted Sapsucker

These are snag dependent species associated with large old-growth trees. The brown creeper and hairy woodpecker are associated with high volume old-growth. The sapsucker is associated with lower volume old-growth and the red squirrel is associated with cone-bearing trees and trees with cavities for nesting.

Habitat for these species is best represented by snag and structure management that uses volume classes as an indicator of coarse canopy forest and stands associated with highly productive sites.

Red-tailed Hawk (Species of Interest)

During the 2000 field season crews observed concentrated activity by raptors in Unit 10. A survey by wildlife biologists in August 200 resulted in finding an active red-tailed hawk nest in Unit. 10. Surveys in 2001 found that there was a pair suspected to be nesting in the area, but was not using the nest from the previous year (Spiering and Zelenak 2001). Additional surveys in the spring of 2002 found the 2000 nest was not occupied (Wilds, J. pers. comm.).

Environmental Consequences

Effects on Wildlife Habitat

Assumptions used in the analysis are that the normal operating season for timber harvest is from April 1 to October 31, and it would take 2 or 3 seasons to harvest the sale.

The Forest Plan directs that marten Standards and Guidelines will be applied to harvest occurring in high-risk biogeographic provinces. The Revillagigedo Island and vicinity is identified as a high-risk biogeographic province. The Forest Plan FEIS (page 3-12) identifies the Cleveland Peninsula as being part of the Revillagigedo Biogeographic Province; therefore marten Standards and Guidelines apply to the Emerald Bay project. All harvest units containing high-value marten habitat are designed to retain at least 10-20 percent canopy closure consistent with the marten Standards and Guidelines. The forest structure that is retained will also provide habitat components for other species as well. Timber harvest objectives for marten (Forest Plan, pp. 4-118 to 4-119) include the following:

- Retain 10-20 percent of the original stand structure.
- An average of at least four large trees/acre.
- An average of at least three large decadent trees/acre.
- Remaining trees should be uniformly distributed throughout the stand, but trees may be clumped for operational concerns or ecological opportunities.
- Retained trees should have a reasonable assurance of windfirmness.
- Retain three pieces/acres of large down trees.

Compared to traditional clearcut harvest, partial harvest requirements mitigate some effects to old-growth associated species in that some forest canopy is provided along with large living and decadent (snag) trees. They may not mitigate effects to species preferring a more closed, unfragmented habitat. Although each action alternative includes harvest of forested wildlife habitat, some key habitats are protected by Forest Plan Standards and Guidelines. These include most Riparian Management Areas (the exception being along Class IV streams), and all beach fringe and estuary fringe habitats. The majority (67 percent) of the project area has been designated as a medium Old-growth Habitat Reserve. Table Wildlife-3 displays the percentage of the VCU in productive old growth forests after implementation of the alternatives.

Table Wildlife-3[1]
Percent POG Remaining in the VCU by Alternative

POG	Alt. A (No Action)	Alt. B	Alts. C and D
High volume	30	27	27
Moderate volume	20	18	17
Low volume	17	16	16
Unproductive Old Growth	31	30	30

[1]Based on Volume strata layers overlayed with unit boundaries
Source: Forest Service, GIS

Coarse Canopy
Volume class 6 and 7 stands are the current best available portrayal of coarse canopy (Puchlerz 2002) and no changes to coarse canopy stands area proposed.

The previous section discusses changes to wildlife habitat (vegetation). Where roads, road access, helicopter operations, or logging camps have the potential to affect specific species, they will be discussed for that species below. The following section discusses how those changes affect the potential habitat capability for each MIS.

Sitka Black-tailed Deer
As noted previously, the deer model estimates the capability of habitats to support deer and does not reflect actual populations in the project area. Model outputs are more useful for comparing relative changes by alternative than indicating actual effects to wildlife species. Table Wildlife-4 displays the habitat capability that would remain following implementation of the action alternatives as compared to the existing habitat capability. This provides a conservative estimate of habitat capability, since uneven-aged stands would have higher habitat values than even-aged treatments. The Emerald Bay action alternatives would decrease deer habitat capability by up to 1 percent. Table Wildlife-5 shows that using the current condition as 100 percent capability, all action alternatives would result in a 1 percent decrease over the WAA. Small scale, uneven-aged silvicultural prescriptions consistent with natural disturbance regimes are most likely to be compatible with the conservation of deer habitat (Swanston et al. 1996). Alternatives C and D rely on single-tree and group selection harvest methods and meet this direction.

Table Wildlife-4
Habitat Capability Changes for Sitka Black-tailed Deer over WAA 1817

	1930	2003	Alt. A	Alt. B	Alt. C	Alt. D
DHC	2191	2190	2190	2168	2169	2169
% Change		0	0	-1	-1	-1

Source: L.LaPorta, 2003.

The State of Alaska Central Southeast Alaska Area Plan identified the Spacious Bay-Ernest Sound area as a "bio-geographical pinchpoint" for deer. Because no harvest occurs at the lower elevations in the OGR, and all units retain some legacy trees (Alternatives C and D leave more than B), there should be no effect on the ability of deer to move along Cleveland Peninsula.

The road proposed in Alternatives B and D would be built to minimum standards and closed upon completion of harvest activities. The presence of the road prism should have no long-term affects on the ability of deer to move along the Peninsula. Edge habitats created by the road may provide temporary foraging habitat as browse species (forbs, fern, and shrubs) become reestablished. After about 15 years, shrubs and conifers begin to dominate most sites and forage species will decrease (Forest Plan FEIS p. 3-366).

There could be increased harvest of deer during the hunting season during the years when operations are going on. Since the hunting season opens August 1, there would be some time when construction workers and loggers would be in the area during the hunting season. While the road would be closed, the roadbed could provide walk-in access to hunters. However, because of the distance from population centers, and potentially rough sea conditions, this use is expected to be minimal. Subsistence use is not expected to increase; see Competition discussion in the Subsistence section of this chapter for additional information.

Marten

Timber harvest units in the action alternatives would retain overstory structure consistent with marten Standard and Guidelines. All harvest treatment on high-value marten habitat would retain at least 10-20 of the original stand structure. Units that fall into the high-volume strata, and below 1,500 feet elevation, are considered high-value marten habitat.

The marten model was developed as a tool to assess the effects of action alternatives in comparison to no action, and assess future habitat suitability and capability within the project area. Model outputs are more useful for comparing relative changes by alternative than indicating actual effects to wildlife species. When the marten model was run for the VCU, the results suggested a 10 to 11 percent decrease in marten habitat capability. Changes to marten habitat and habitat capability are shown in Table Wildlife-5.

Table Wildlife-5
High-value Marten Habitat in VCU 7210 (High Volume POG lower than 1,500 feet elevation)

	2003	Alt. A	Alt. B	Alt. C	Alt. D
High Value Marten Habitat (acres)	2,084	2,084	1,844	1,836	1,836
Percent change	0	0	-12	-12	-12
Habitat Capability	17.55	17.55	15.81	15.64	15.64

Source: Forest Service, GIS Volstrata layer & marten model

The amount of timber harvest in high-value marten habitat is similar under all action alternatives. None would occur in the estuary buffer. Even those units with partial-cut harvest would fall out of the high-value habitat component since they are no longer high-volume stands. Thus any timber harvest in high-value marten habitat would reduce that habitat accordingly.

Studies on marten have shown that the main effects of roads are a result of increased access to trappers (Ruggerio et al. 1994). Trapping season occurs outside of the periods when construction workers or loggers would be in the project area. While the road could provide trappers access, it is unlikely that there would be much use during the winter trapping period. The area is some distance from any population centers and can have dangerous winter water and landing conditions. The physical presence of the road prism and clearing through the OGR should have no long-term effects on movements of marten on the Peninsula. It is expected that alder would become restablished within 10 to 20 years, and logs and stumps placed on the roadbed would provide cover for prey species.

Brown Bear

Wildlife biologists from the USFS, USFWS, and ADGF walked the road location through the OGR in June 2000. Notes from this survey indicate that no important late summer season brown bear feeding sites were identified. These notes also state that brown bear late summer habitats are unlikely to be greatly effected by this project. However, more recent information suggests this may not be accurate. Both Boyd Porter (ADF&G) and Steve Brockman (FWS) have indicated that the area is important brown bear habitat (Reeck, J. pers. comm.). Emerald Creek appears to fit criteria 4b in TPIT, Appendix A (Powell 1998). Participants in a botany field trip in the fall of 2003 noted numerous bear trails in and around the Emerald Creek/estuary. A small portion of Unit 12 (about 2-3 acres) may be located within the brown bear foraging buffer and the road (Alternatives B and D) does have several stream crossings. The grassy tide flats/estuary is an important foraging area in the spring when bears are foraging on grasses. This lower section is protected by the Beach/Estuary LUD designation.

Based on the Fisheries analysis of harvest, roads and stream crossings with incorporation of mitigation and BMPs, no measurable effects to the fisheries resource are anticipated. In addition, the TLRMP Beach and Estuary LUD includes a 1,000 foot buffer; this should maintain spring foraging habitat. As a result, no effects on the availability of foraging habitat for brown bears are expected.

Because of increased human activities there is the potential for increased mortality through legal hunting, defense of life or property, and illegal mortality through encounters with workers during the two or three years of project operations. "Defense of life or property" bear kills in other logging camps has been low and this is not considered a major concern (USDA Forest Service Finger Mountain Timber Sale EIS, 2003). Any land-based camp would be located outside of the OGR. In addition, while roads in Alternatives B and D would be closed to motorized vehicle use, the roadbed could increase walk-in access for hunters.

All alternatives would include the use of helicopters. This could cause temporary displacement of individuals in the area. However, this would be expected to be short-term (during project activities) and bears would use the area during periods of inactivity.

The State of Alaska Central Southeast Alaska Area Plan identified the Spacious Bay-Ernest Sound area as a "bio-geographical pinchpoint" for brown bears. Because the harvest occurs outside of the OGR (except for 14 acres of clearing for the road), the maintenance of the 500 foot buffer along the anadromous stream stretch (with the added mitigation to modify Unit 12), and riparian buffers along the non-anadromous streams, riparian corridors will maintain cover and foraging habitat for this species. Bears aren't tied specifically to vegetative cover and there should be no effect on the ability of brown bears to move along Cleveland Peninsula following harvest under any of the action alternatives.

Mountain Goat

Mountain goats have the potential to be affected through loss of winter habitat. The area was closed to taking mountain goat by the ADF&G due over-hunting and potential extirpation concerns. Because the hunting season for goats is closed, increased access to hunters is currently not an issue. If the hunting season was opened during or after project activities, the road could improve walk-in access. The road in Alternatives B and D would be put into storage after completion of the timber sale and would be revegetated by alder within 10 to 20 years. At that point, access would be similar to current conditions.

Some areas classified as escape terrain (slopes greater than 50 percent) would be harvested under all alternatives. Under Alternative B 122 acres of escape terrain would be harvested, while under Alternatives C and D, 124 acres would be harvested. This is about 6 percent of the existing escape terrain in the project area (see Table Wildlife 6). There would still be 94 percent of the escape terrain that is not proposed for harvest and would remain in its current condition. The remainder of the harvest acres lie within high use areas (1,300 feet of escape

terrain). Table Wildlife-6 shows the difference in mountain goat habitat over the VCU for all of the alternatives.

Table Wildlife-6
Escape Terrain[1] and High Use Areas[2] in VCU 7210 Remaining After Harvest

	Alt. A	Alt. B	Alt. C	Alt. D
Escape Terrain Acres	1,956	1,834	1,832	1,832
Change	0%	-6%	-6%	-6%
High Use Area Acres	4,768	4,249	4,235	4,235
Percent change	0%	-11%	-11%	-11%

Source: Forest Service, GIS Volstrata layer
[1]Slopes greater than 50%
[2]Escape terrain plus POG within 1,300 feet of escape terrain

Goats would be expected to use escape terrain in the fall. Most of the escape terrain in the VCU is located to the north and west of the harvest area and access into these areas would not be improved by the proposed roads (Alternatives B and D). However, another area of escape terrain is found along the eastern edge of the project area along the ridge dividing the project area from the Spacious Bay and Sunny Bay areas. The proposed roads in Alternatives B and D would improve walk-in access into this area. If a season was opened while the project is occurring, and established between August 1 to December 31, the early part of the season would occur during project activities. During project activities disturbance could cause displacement into the larger area of escape terrain to the north or into higher elevation escape terrain to the south, outside of the VCU and vulnerability to hunters may not greatly increase. However, after work ceases for the season, and after project completion, goats using the smaller area of escape terrain accessed by the road may be more vulnerable to hunters.

During winter months, adjacent stands of POG are important for intercepting snow and improving mobility and availability of forage high use areas. Alternatives C and D, which retain 50 percent of the canopy, would retain more value as potential habitat during the winter months. The remaining canopy would still function to intercept snow and make forage available in the understory. However, mobility within the majority of the units would be more limited than under present conditions. After harvest, there could be an 11% decrease in these high use areas. There are two low-elevation passes (1,400 and 1,600 feet elevation) along the ridge that defines the eastern edge of the project area. There would be harvest units located along the southern part of the eastern boundary, but forested stands along the northern boundary would remain intact under all alternatives. These passes, as well as the one on the southern boundary (1,200 feet elevation) would remain in their current condition, and goat movements are not expected to be affected.

Forest Plan direction (page 4-117) includes maintenance of a 1,500 foot distance from summer and kidding habitat during helicopter yarding. This would be incorporated during project activities and may help reduce displacement.

Bald Eagle

The Bald Eagle Protection Act provides for special management for bald eagles. The USFWS and the Forest Service maintain an interagency agreement for bald eagle habitat management in the Alaska Region, which includes standards and guidelines for regulating human disturbance within identified bald eagle use areas. These bald eagle and riparian Forest-wide standards and guidelines are specifically designed to protect bald eagle nesting habitat. This agreement requires a 330-foot habitat management zone around all bald eagle nests and excludes all land use activity within this zone. The proposed road in Alternatives B and D is within 330 feet of a bald eagle nest tree. Timing of blasting for rock pit and road right-of-ways would be required within ½ mile of the bald eagle nest. Other road construction and logging activities under

Alternatives B and D, or multiple helicopter trips under Alternative C within this buffer will require a variance from the Agreement from the U.S. Fish and Wildlife Service. This variance would be requested as necessary to support the public investment associated with the project.

Currently it is not known how active this nest has been. Responses to disturbance may vary from temporary temporal or spatial avoidance to total reproductive failure and abandonment of breeding areas. Responses vary depending on the type, intensity, and timing of the disturbance, as well as the age condition and breeding status of the birds (Joslin and Youmans 1999). Surveys would be done before any activities were initiated to determine the status of the nests.

Alexander Archipelago Wolf

Primary effects to this species are associated with changes in prey populations or distribution, and increased access to hunters and trappers. The road in Alternatives B and D would not affect prey density or distribution over the long-term (see Deer section). The OGR would still provide deer winter range, which is considered the most limiting factor for deer. Based on the analysis for deer, there would be very little change in habitat capability for deer within the area (see Table Wildlife-4).

The Forest Plan includes direction to maintain 13 deer per square mile to support wolves (Forest Plan 4-114). As a result of monitoring, this has been changed to 18 deer per square mile (Monitoring and Evaluation Report 2000). Based on the deer model, the WAA currently has habitat for 21.9 deer per square mile. After implementation of any of the action alternatives it would drop to 21.7 deer per square mile.

Current road density in the VCU is 0 miles per square mile. During project activities, road densities would increase to 0.5 miles per square mile in Alternative B and 0.3 miles per square mile in Alternative D. Following project activities the roads would be put into storage and, over the long-term, road densities would drop to 0 miles per square mile in all alternatives.

During project activities there could be some displacement of deer and/or wolves. There would also be increased vulnerability of wolves to legal hunting (after September 1 to end of work season). Studies have shown that the main effect of roads is increased access to humans and the increased chance of mortality (Thiel 1985, Mech 1989). Recent information suggests that 19 wolves were taken off the Cleveland Peninsula during the winter of 2003/2004 (J. Reeck, pers. comm.)

The State of Alaska Central Southeast Alaska Area Plan identified the Spacious Bay-Ernest Sound area as a "bio-geographical pinchpoint" for wolves. Wolves are generally not tied to specific types of cover. All harvest units would maintain some residual overstory and would not affect their ability to move through the area and along Cleveland Peninsula. While the road could provide access, it is unlikely that there would be much use. The area is some distance from any population centers and can have dangerous winter water and landing conditions.

Brown Creeper, Hairy Woodpecker, Red Squirrel, Red-breasted Sapsucker

Habitat for brown creepers and hairy woodpeckers would be reduced in all alternatives, as the treated stands would not be high volume stands after harvest. Currently, 30 percent of the project area is high-volume POG; after implementation of any of the action alternatives there would be 27 percent in high volume POG (see Table Wildlife-3).

All the harvested stands would continue to provide habitat for the red squirrel and red-breasted sapsucker. All units would have residual live trees, standing snags, and downed logs due to partial harvest or implementation of marten Standards and Guidelines in the harvest units. Snag habitat should not be a limiting factor in the project area as there has been no previous harvest. Retention of the medium OGR, estuary, and riparian buffers, as well as undeveloped portions of harvested units would maintain habitat across the project area.

Red-tailed Hawk (Species of Interest)

If the known nest, or another nest is found to be occupied, it would be protected with a forested 600-foot windfirm buffer. Disturbance would be prevented during the active nesting season (generally March 1 to July 31). Annual monitoring would be conducted for at least 2 years to determine nest activity. If the nest remains inactive for 2 consecutive years, protection measures may be removed.

Cumulative Effects

The only other ground-disturbing activity that has occurred in WAA 1817 is the beach harvest in the 1930s. Within WAA 1817 there are no planned sales on the FY03-12 Timber Sale Plan. Because there are no planned activities in the foreseeable future, this project will not contribute cumulative effects to the WAA.

Movements of species along the Cleveland Peninsula would not be impacted by this project. As discussed previously, the distance across from Emerald Bay to Spacious Bay is 5 miles; 0.75 miles are within the area available for harvest. There would be no harvest within the other 4.25 miles and north-south movements along the Peninsula would not be affected by this project.

Mitigation and Monitoring

The primary wildlife direction is included in the Forest Plan, Chapters 3 (Land Use Designations, including Old-growth Habitat) and 4 (the Forest-wide Standards and Guidelines), and Appendix K. Site-specific implementation requirements include mitigation such as leaving nonmerchantable trees, timing or routing restrictions on helicopter yarding, and protection of nests and dens. After project completion, all roads would be put into storage.

After field reviews in 2003 it was concluded that a small portion of Unit 12 (about 2-3 acres) lies within the brown bear foraging habitat buffer. This unit will be modified to exclude this area.

Chapter 4

Lists

Chapter 4

Lists

Preparers

The following is a list of contributors to the Emerald Bay Environmental Impact Statement. Other Forest Service employees contributed to the completion of this document through their assistance in support functions. Their help is greatly appreciated.

Original Interdisciplinary Team Members

Colleen Grundy, Project Manager/Team Leader
Education
B.S., Forest Resources, Michigan Technological University, 1979
Certified Silviculturist 1995
Forest Service: 20 years
District Silviculturist, Tongass NF, Ketchikan-Misty Fiords Ranger District, 7 years
Forester, Tongass NF, Ketchikan-Misty Fiords Ranger District, 12 years
Silviculture/Planning Staff Ketchikan-Misty Fiords Ranger District, 2 years

John Autrey, Archaeologist
Education
MA Social Science/Anthropology, University of Northern Colorado, 1973
Forest Service: 20 years
Forest Archaeologist, Tongass NF, Ketchikan Area, 12 years
Assistant Forest Archaeologist, Kaibab NF, 2.5 years
Archaeological Technician, Tongass NF, Chatham Area, 3 years
Forestry Technician, Arapahoe Roosevelt NF, 2.5 years

Dave Fletcher, Timber Management Assistant
Education
B.S. Forestry, University of Washington, 1974
Forest Service: 14 years
Planner, Tongass NF, 3 years
Timber Management Assistant, Tongass NF, 11 years
Other Relevant Experience
Peace Corps Volunteer, 3 years
Bureau of Indian Affairs, Neah Bay, Washington, 3 years

Jack Oien, Transportation Planner
Forest Service: 23 years
Transportation Planner, Tongass NF, Ketchikan Area, 7 years
Project Engineer, Tongass NF, Ketchikan Area, 4 years
Transportation Planner, Mt. Baker Snoqualmie N.F, 2 years
Project Engineer, Tongass NF, Ketchikan Area, 4 years
Construction Inspector, Lolo NF, 6 years

Mike Brown, Wildlife Biologist
Education
M.S., Animal Ecology, Iowa State University, 1985
Forest Service: 8 years
Wildlife Biologist, Tongass NF, Ketchikan Area, 7 years
Supervisory Fish and Wildlife Biologist, Ketchikan-Misty Fiords Ranger District, 1 year
Other Relevant Experience
Wildlife Technician/Biologist, U.S. Fish and Wildlife Service, Vicksburg, MS, 3 years
Wildlife Biologist, Florida Game and Fish Commission, Hollywood, FL, 2 years

Dennis Landwehr, Soils Scientist/Watershed
Education
B.S., Forest Management with Soils minor, University of Wisconsin-Stephens Point, 1985
Forest Service: 11 years
Soils Scientist, Tongass NF, Ketchikan Area SO, 10 years
Other Relevant Experience
Soil Scientist, Natural Resource Conservation Service, Illinois, 1.5 years
Soil Scientist, Natural Resource Conservation Service, Washington, 5 months
Soil Conservationist, Natural Resource Conservation Service, Wisconsin, 1 year

Cameron Thomas, Fisheries Biologist/Watershed
Education
B.S., Fisheries Science, Humboldt State University, 1994
Forest Service: 8 years
Fish Biologist, Tongass NF, Ketchikan-Misty Fiords Ranger District, 3 years
Fish Biologist, Tongass NF, Thorne Bay Ranger District, 3 years
Fisheries Co-op ed student, Tongass NF, Misty Fiords NM, 2 years
Other Relevant Experience
Fish Trap worker, Humboldt Foundation, 3 seasons
Volunteer, F&WS, GAU, Homer, Alaska, 1 season

William E. Angelus, Landscape Architect
Education
B.L.A., University of Florida, 1974
Registered Landscape Architect since 1976
Forest Service: 6 years
Landscape Architect, Tongass NF, Ketchikan Area, 6 years
Other Relevant Experience
Regional Planning Firm, Florida, 2 years
Florida Department of Transportation, 1 year

Supplemental EIS Interdisciplinary Team Members

John Natvig, Team Leader, TEAMS Enterprise
Education
B.S. Forest Management, Iowa State University, 1980
Certified Silviculturist 1992
Forest Service: 23 years
Silviculturist, TEAMS Enterprise, 2 years
Timber Management Assistant, Black Hills NF, Northern Hills Ranger District, 3 years
Timber Management Assistant, Routt NF, North Park Ranger District, 3 years.
Silviculturist, Black Hills NF, Harney Ranger District, 3 years.
Forester, Black Hills NF, Nemo Ranger District, 10 years

Pat Haley, Team Leader, Ketchikan-Misty Fiords Ranger District
Education
B.S. Forest Management, Oregon State University, 1980
Forest Service: 24 years (since 1980)

Silviculturist/ID Team Leader, Tongass NF, Ketchikan-Misty Fiords RD, 1 year
District Silviculturist, Mt. Hood NF, Barlow Ranger District, 14 years
Presale Forester & Sale Administrator, Coos Bay BLM, 3 years.
Silviculture Forestry Technician, Siuslaw NF, Waldport Ranger District, 6 years

Jerry Ingersoll, District Ranger/Reviewer
Education
M.S. Wildland Resource Science, University of California Berkeley, 1987
B.S. Forestry, University of California Berkeley, 1985
Forest Service: 15 years (since 1987)
District Ranger, Tongass NF, Ketchikan-Misty Fiords Ranger District, 3 years
Forest Planner, Grand Mesa-Uncompahgre and Gunnison NF, 2 years
Planning Team Leader, Humbolt-Yoiyabe NF, Spring Mt. National Recreation Area, 3 years
Forest Planner, Quachita NF, 3 years
Timber Management Assistant, Quachita NF, Womble Ranger District, 3 years
Reforestation Forester, Quachita NF, Jessieville Ranger District, 1 year

Jill Reeck, Wildlife Biologist
Education
B.S. Wildlife & Fisheries Science, South Dakota State University, 1981
B.S. Biology, South Dakota State University, 1981
Forest Service: 23 years (since 1980)
Wildlife Biologist, Tongass NF, Ketchikan-Misty Fiords Ranger District, 1 year
Wildlife Biologist, Black Hills NF, Northern Hills RD, 14 years
Wildlife Biologist, Tongass NF, Thorne Bay RD, 4 years
Wildlilife Biologist, Uncompaghre NF, Ouray RD 2 years
Biotech (co-op), Routt NF, Hahn's Peak RD and SO, 2 years

Todd Tisler, Fish and Wildlife Staff
Education
B.S. Biology, University of Wisconsin -Stevens Point, 2000
Forest Service: 11 years (since 1991)
Fish and Wildlife Staff - Ketchikan-Misty Fiords Ranger District, 1 year
Hydrological Technician- Tongass NF, 2 years
Biological Technician-Tongass NF - Ketchikan Ranger District, 5 years
Biological Technician-Tongass NF - Forestry Sciences Lab (Juneau), 2 years
Fisheries Biologist - Deschutes National Forest, 1 year

Mike North, Logging Systems Specialist
Education
B.S. Forest Management, University of California, Berkeley, 1985
Forest Service: 22 years
Logging Systems Specialist, TEAMS Enterprise, 2 years
Timber Sale Administrator, Small Sales Officer, IDT Leader, Tongass NF, 12 years
Forestry Technician, Plumas NF, 8 years

Betsy Hamann, Wildlife Biologist
Education
B.S. Wildlife Biology, Montana State University, 1982
Forest Service: 21 years
Wildlife Biologist,, TEAMS Enterprise, 2 years
Wildlife Biologist, Caribou-Targee NF, 2 years
Wildlife Biologist, Beaverhead-Deerlodge NF, 15 years

Liz LaPorta, GIS Ecologist
Education
B.S. Ecology & Systematic Biology, Cal Poly State University, San Luis Obispo, 1995
Forest Service: 3 years
GIS Ecologist, TEAMS Enterprise, 1 year
GIS Technician, Tongass NF, Thorne Bay Ranger District, 2 years
Range Technician, San Juan NF, Dolores Ranger District, 1 season
Other Relevant Experience:
GIS/Environmental Coordinator, Sealaska Timber Corporation, Alaska, 5 years

Jan Spencer, Landscape Architect
Education
B.L.A., Utah State University, 1988; A.S., Northwest Community College, 1983
Forest Service: 14 years
Landscape Architect/IDT Leader, TEAMS Enterprise, 1 1/2 years
Landscape Architect, White River NF, 11 years
Acting Regional Landscape Architect, Rocky Mountain Region, 1 year

Other Key Contributors

Devin Fox - Timber
Pete Klein - GIS
Gerald Lemke - GIS
Sandy Powers - Writer-Editor/Tech Reviewer
Neil Babik - Soils
Al Grundy - GIS Analyst
Martin Stanford – Archeology

Distribution List

A copy of the Emerald Bay Draft SEIS was sent to the following agencies, organizations, businesses, public officials, municipalities and IRA tribes. These parties either requested a copy of the EIS during the scoping process, at some other time in the NEPA process, are part of the Forest Service's mandatory mailing list (Forest Service Handbook 1909.15, Sections 23.2 and 63.1) or are recognized municipalities or IRA tribes potentially affected by, or interested in, the Emerald Bay project.

Individuals

Richard & Kay Andrew, Ketchikan, AK
Ernesta Ballard, Juneau, AK
Mike Cessnun, Ketchikan, AK
Gershon Cohen, Haines, AK
Harold Enright, Ketchikan, AK
Earl Fosse, Ketchikan, AK
Patrick Garza, Ketchikan, AK
Ed & Marian Glenz, Meyer's Chuck, AK
William S. Haag, Kodiak, AK
Hank Hays, Bainbridge Is., WA
Jill Jacob, Ward Cove, AK
Mike Jausoro, Ketchikan, AK
Donald & Terry Johnson, Meyer's Chuck, AK
Chere Klein, Ketchikan, AK
Dave Lieben, Ketchikan, AK
Thomas F. Martinez Jr., Ketchikan, AK
Tim Miles, Juneau, AK
Richard Myren, Juneau, AK
Richard Olmstead, Ketchikan, AK
Ronald Paden, Twain Haute, CA
Steve & Cassey Peavey, Meyer's Chuck, AK
Lauretta & Keith Wolfe, Ward Cove, AK
Charles Pool, Ketchikan, AK
Peter E. Rice, Ketchikan, AK
Bill Rotecki, Ketchikan, AK
Mike Sallee, Ketchikan, AK
Tom & Ellen Scott, Meyer's Chuck, AK
Charles W. Stout, Ward Cove, AK
Jim VanAltvorst, Ketchikan, AK
George & Dro Winter, Ketchikan, AK
Michael Zelensky, Ketchikan, AK
Paul Axelson, Ketchikan, AK
Jim & Margaret Barry, Ketchikan, AK
Ray & Pat Chapman, Meyer's Chuck, AK
Harold & Ellen Cowan, Ward Cove, AK
Ken Fitch, New York, NY
Barney Freedman, Thorne Bay, AK
Johny Gilson, Ketchikan, AK
Bill Green, Ketchikan, AK
Mary Hastings, Ketchikan, AK
Eric Hummel, Ketchikan, AK
Bennie Jankowski, Meyer's Chuck, AK
Brad Johnson, Meyer's Chuck, AK
Denver & Nancy Keesecker, Meyer's Chuck, AK
Al & Mimi Kaotlarov, Ketchikan, AK
James Llanos, Sr., Ketchikan, AK
Robert Meyer III, Meyer's Chuck, AK
Brad & Kathy Miller, Ketchikan, AK
Fred Norman, Ketchikan, AK
Dan Pack, Meyer's Chuck, AK
Louie & Cindy Wagner, Metlakatla, AK
Scott Paul, Washington, DC
Mike Sallee, Ketchikan, AK
Bill Pfeifer, Ketchikan, AK
Julie Powers, Ketchikan, AK
Jeffrey Rodger, Ketchikan, AK
Brien Salazar, Ketchikan, AK
Dixie Sanders, Lyons, OR
Paul Slenkamp, Ward Cove, AK
Len Tiemersma, Ketchikan, AK
Susan Walsh, Ketchikan, AK

Agencies, Organizations, Businesses, Municipalities, and Tribes

Aboriginal Rights Committee, Tom Lang, Sr., Chairman, Metlakatla, AK
Advisory Council on Historic Preservaton, Director, Washington, DC
Alaska Center for the Environment, Karen L. Button, Anchorage, AK
Alaska Forest Association, Rachel Moreland, Ketchikan, AK
Alaska Forest Association, Owen Graham, Ketchikan, AK
Alaska Power & Telephone Co., Glen Martin, Port Townsend, WA
Alaska Rainforest Campaign, Brian McNitt & Corrie Bossman, Sitka, AK
Alaska State Dept. of Fish & Game, Bill Hanson, Regional Supervisor, Douglas, AK
Alaska State Dept. of Fish & Game, Jim Cariello, Petersburg, AK
Alaska State Dept. of Fish & Game, Tom Paul, Douglas, AK
Alaska State Dept. of Fish & Game, Mike Turek, Douglas, AK

Alaska State Dept. of Env. Conservation, Kevin Hanley, Juneau, AK
Alaska State Dept. of Natural Resources, Office of Project Management Planning, Lorraine Marshall, Juneau, AK
Alaska State Dept. of Natural Resources, Office of Project Management Planning, Jennifer Garland, Juneau, AK
Alaska State Dept. of Transportation, David Hawes, Juneau, AK
Alaska State Dept. of Natural Resources, Jim Anderson, Juneau, AK
Alaska State Dept. of Natural Resources, Mike Curran, Ketchikan, AK
Alaska State Dept. of Natural Resources, Office of Project Management and Permitting, Juneau, AK
Alaska State Dept. of Natural Resources, Paul Slenkamp, Ketchikan, AK
Alaska State Division of Governmental Coordination, Lorraine Marshall, Juneau, AK
Alaska State Library, Juneau, AK
Alaska Timber Management, Chris Nelson, Ketchikan, AK
Alaska Woods Service Company, Eric Muench, Ketchikan, AK
AMHT Trust Land Office, Doug Cambell, Anchorage, AK
Alaskans for Responsible Resource, Gregory Head, Craig, AK
Alcan Timber, Eric Nichols, Ketchikan, AK
ANS Camp #10, Angela Kadake, President, Kake, AK
Applied Sociocultural Research, Michael Galginaitis, Anchorage, AK
Cape Fox Corp, Peter Gigante, Ex. Director, Ketchikan, AK
Cascadia Wildlands Project, Gabriel Scott, Fairbanks, AK
Center for Biological Diversity, Corrie Bosman, Sitka, AK
Center for Biological Diversity, Cathy Siegel, Idyllwild, CA
Citizens' Advisory Commission on Federal Areas, Stan Leaphart, Ex. Director, Fairbanks, AK
City of Ketchikan, Mayor Bob Weinstein, Ketchikan, AK
City of Saxman, Mayor Dan Williams, Ketchikan, AK
City of Wrangell, Mayor, Wrangell, AK
Cleveland Users Coalition, Darryl Williams, Ward Cove, AK
Colorado State University, Judy Smith, Ft. Collins, CO
Concerned Alaskans for Res. & Environment, Dick Coose, Ketchikan, AK
Craig Community Association, Millie Stevens, President, Craig, AK
Craig Public Library, Mary Lucille Born, Craig, AK
Earthjustice, Irene Alexakos, Juneau, AK
Earthjustice, Tom Waldo, Juneau, AK
Edna Bay Advisory Committee, Edna Bay, AK
Edna Bay School, Edna Bay, AK
Evergreen Timber LLC, Rick Ludwigsen, Ketchikan, AK
Farwest Research, Pat Roppel, Wrangell, AK
Federal Aviation Administration, Regional Administrator, Anchorage, AK
Federal Highway Administration, Regional Administrator, San Francisco, CA
Federal Railroad Administration, Office of Transportation & Regulatory Affairs, Washington, DC
First Bak, William Moran, Jr., Ketchikan, AK
Forest Conservation Council, Bryan Bird, Santa Fe, NM
Forestry Library B50 NRAB U of M., Cheryl Owens, St. Paul, MN
Foster Wheeler Environmental Inc., Al Wolfson, Bothell, WA
Greenpeace, Larry Edwards, Sitka, AK
Harbour Log, Don Harbour, Ketchikan, AK
Hollis Public Library, Hollis, AK
Howard Valentine School, Coffman Cove, AK
Hyder Public Library, Hyder, AK
Interstate Commerce Commission, Chief, Energy & Environment, Washington, DC
Juneau Empire, Juneau, AK
Juneau Public Library, Juneau, AK
Kake Community Library, Kake, AK
Kasaan Community Library, Kasaan, AK
Ketchikan Chamber of Commerce, Sandra Phillips, Ketchikan, AK
Ketchikan Chamber of Commerce, Cliff Skillings, Ketchikan, AK

Ketchikan Daily News, Tom Miller, Ketchikan, AK
Ketchikan Gateway Borough, Roy Eckert, Borough Manager, Ketchikan, AK
Ketchikan Gateway Borough, Steven Reeve, Ketchikan, AK
Ketchikan Gateway Borough, Mayor Mike Salazar, Ketchikan, AK
Ketchikan Gateway Borough, John Hill, Ketchikan, AK
Ketchikan High School, Ketchikan, AK
Ketchikan Homebuilders Association, Ketchikan, AK
Ketchikan Indian Community, Marly Edenso, Ketchikan, AK
Ketchikan Indian Community, Merle Hawkins, Subsistence Chairman, Ketchikan, AK
Ketchikan Indian Community, Robert Sanderson Jr., Ketchikan, AK
Ketchikan Indian Community, Charlie White, President, Ketchikan, AK
Ketchikan Outdoor Recreation and Trails Coalition, Jim Mitchell, Ketchikan, AK
Ketchikan Public Library, Ketchikan, AK
Ketchikan Public Utilities, Ketchikan, AK
Ketchikan Sport and Wildlife Club, Ketchikan, AK
Kettleson Memorial Library, Sitka, AK
Klawock Public Library, Klawock, AK
Klukwan Inc., Jim Tuttle, Chief Forester, Ketchikan, AD
Koncor Forest Products Co., Dr. Geoffrey McNaughton, Anchorage, AK
Kootznoowoo Inc., Juneau, AK
L-Ply, Chuck Lockhart, Port Angeles, WA
Marine Advisory Program, UAF, Ms. Dolly Garza, Vice-Chair, Ketchikan, AK
Metlakatla Community School Library, Metlakatla, AK
Metlakatla Indian Community, Mayor Victor Wellington, Metlakatla, AK
Metlakatla Indian Community, Marcus Nelson, Councilman, Metlakatla, AK
Meyers Chuck Community Assn., Robert & Jacquelyne Hunley, Meyers Chuck, AK
Meyers Chuck Community Assn., Debbie Johnson, Meyers Chuck, AK
Montomery Watson Harza, Jeff Boyce, Bellevue, WA
National Marine Fisheries Service, Protected Resources Management Division, Juneau, AK
National Park Service, Anchorage, AK
Natural Resources Defense Council, Nathaniel Lawrence, Senior Atty., Olympia, WA
Naukati School, Ketchikan, AK
Office of Program Review & Education, Adv. Council on Hist. Preservation, Washington, DC
Organized Village of Saxman, Joe Williams, President, Ketchikan, AK
Pacific Log & Lumber, Ltd., Frank Age & Steve Seley, Ketchikan, AK
Parametrix, Inc., Pam Gunther, Kirkland, WA
Petersburg Public Library, Petersburg, AK
Port Alexander School, Port Alexander, AK
Port Protection School, Ketchikan, AK
Prince of Wales Community Advisory Committee, Ginny Tierney, Thorne Bay, AK
Revilla High School, Janet Landis, Ketchikan, AK
Saanya Kwan – Tei Kweidi, Martin Perez, Sr., Ketchikan, AK
SE AK Reg. Subsistence Council, William C. Thomas, Chairman, Ketchikan, AK
Sealaska Corporation, Pete Huberth, Juneau, AK
Sealaska Corporation, Ron Wolfe, Juneau, AK
Sealaska Corporation, Chris McNeil, Jr., President/CEO, Juneau, AK
Sierra Club, Marc Rorick, Juneau, AK
Sierra Club Legal Defense Fund, Inc., Eric Jorgensen, Juneau, AK
Silver Bay Logging, Dick Buhler, Wrangell, AK
Silver Bay Logging, Jerry Kilanowski, Wrangell, AK
Sitka Conservation Society, Page Else, Sitka, AK
Southeast Alaska Conservation Council, Matthew Davidson, Juneau, AK
Southeast Alaska Conservation Council, Aurah Landau, Juneau, AK
Southeast Alaska Conservation Council, Katya Kirsch, Juneau, AK
Southeast Alaska Land Acquisition, Ray Roberts, Ketchikan, AK

Southeast Alaska Outdoor Recreation, Rick Watson, Ketchikan, AK
Southeast Alaska Resources, Ketchikan, AK
Southeast Stevedoring Corporation, Jim Taro, Ketchikan, AK
Territorial Sportsmen, Inc., Mal Linthwaite, President, Juneau, AK
The Wilderness Society, Nicole Whittington-Evans, Anchorage, AK
Thorne Bay City, Kim Kain, Thorne Bay, AK
Thorne Bay Community Library, Thorne Bay, AK
Thorne Bay School, Thorne Bay, AK
Tongass Conservation Society, Elmer Makua, Ketchikan, AK
Tongass Conservation Society, Wayne Weihing, Ward Cove, AK
Tongass Tribe, Willard Jackson, Ketchikan, AK
University of Alaska – SE, Kathleen Wiechelman, Librarian, Ketchikan, AK
University of Alaska Land Management, Steve Connelly, Anchorage, AK
University of Alaska Land Management, Lisa Holzapfel, Anchorage, AK
URS Corporation, A. Dave Every, Seattle, WA
US Army Corps of Engineers, Field Office Manager, Juneau, AK
US Army Corps of Engineers, Steve Duncan, Regulatory Branch, Anchorage, AK
US Army Engineer District, Michiel E. Holley, Unit Coordinator, Anchorage, AK
US Army Engineer Pacific Ocean Division, Fort Shafter, HI
US Coast Guard, Environmental Impact Branch, Washington, DC
US Congress, Ted Stevens, Juneau, AK
US Dept. of Energy, Office of Env. Compliance, Washington, DC
US Dept. of Housing & Urban Development, HUD Field Environmental Contact, Anchorage, AK
US Environmental Protection Agency, EIS Review Coordinator, Seattle, WA
US Environmental Protection Agency, Anchorage, AK
US Navy, Office of Chief of Navy Operations, Washington, DC
US House of Representatives, Hon. Don Young, Washington, DC
US Senate, Senator Lisa Murkowski, Anchorage, AK
USDA APHIS PPD/EAD, Deputy Director, Riverdale, MD
USDA Forest Service, Craig Ranger District, TNF, Craig, AK
USDA Forest Service, Petersburg Ranger District, TNF, Petersburg, AK
USDA Forest Service, Thorne Bay Ranger District, TNF, Thorne Bay, AK
USDA Forest Service, Sitka Ranger District, TNF, Sitka, AK
USDA Forest Service, Wrangell Ranger District, TNF, Wrangell, AK
USDA Forest Service, Hoonah Ranger District, TNF, Hoonah, AK
USDA Forest Service, Yakutat Ranger District, TNF, Yakutat, AK
USDA Forest Service, Juneau Ranger District, TNF, Juneau, AK
USDA Forest Service, Admiralty Ranger District, TNF, Admiralty, AK
USDA Forest Service, Tongass Nat. Forest, Petersburg S.O., Petersburg, AK
USDA Forest Service, Tongass Nat. Forest, Sitka S.O., Sitka, AK
USDA Forest Service, Tongass Nat. Forest, Ketchikan S.O., Ketchikan, AK
USDA Forest Service, Director, Regional Office, Juneau, AK
USDA Forest Service, Winifred Weber, Regional Office, Juneau, AK
USDA Forest Service, Chugach Nat. Forest, Anchorage, AK
USDA Forest Service, Director, Ecosystem Mgmt. Coord., Washington, DC
USDA National Resources Conservation Service, National Environmental Coordinator, Washington, DC
USDA National Agricultural Library, Head, Acqui. and Serials Branch, Beltsville, MD
USDI Bureau of Indian Affairs, Erica Reith, Juneau, AK
USDI Bureau of Land Management, Anchorage, AK
USDI Fish & Wildlife Service, Steve Brockman, Juneau, AK
USDI Fish & Wildlife Service, Ed Grossman, Juneau, AK
USDI Fish & Wildlife Service, Laverne Smith, Anchorage, AK
USDI Office of Env. Policy & Compliance, Director, Washington, DC
USDI Office of Env. Policy & Compliance, Pamela Bergmann, Reg. Env. Officer, Anchorage, AK
Viking Lumber Co., Kirk Dahlstrom, Craig, AK

Wrangell Cooperative Association, John Feller, President, Wrangell, AK
Wrangell Public Library, Wrangell, AK
Wrangell Resource Council, Joel Hanson, President, Wrangell, AK
Yes Bay Lodge, Kevin Hack, Ketchikan, AK

4 Lists

Glossary

Access
The opportunity to approach, enter, and make use of public lands.

Access Management
Acquiring rights and developing and maintaining facilities needed by people to get to and move through public lands (physical attributes).

Alaska National Interest Lands Conservation Act (ANILCA)
Passed by Congress in 1980, this legislation designated 14 National Forest Wilderness areas in Southeast Alaska. The Alaska National Interest Lands Conservation Act of December 2, 1980, Public Law 96-487, 96th Congress, 94 Stat. 2371-2551, Section 810 requires evaluations of subsistence impacts before changing the use of these lands.

Alaska Native Claims Settlement Act (ANCSA)
Public Law 92-203, 92nd Congress, 85 Stat. 2371-2551. Approved December 18, 1971, Native Claims Settlement Act (ANCSA). ANCSA provides for the settlement of certain land claims of Alaska Natives and for other purposes.

Alluvial Fan
A cone-shaped deposit of organic and mineral material made by a stream where it runs out onto a level plain or meets a slower stream.

Alpine
Parts of mountains above tree growth and/or the organisms living there.

Alternative
One of several policies, plans, or projects proposed for decision making.

Anadromous Fish
Anadromous fish (such as salmon, steelhead, and sea-run cutthroat trout) spend part of their lives in freshwater and part of their lives in saltwater.

Anadromous Species
One whose individuals are born in freshwater but migrate to and feed in the sea before returning to freshwater to breed.

Background
The distant part of a landscape. The seen or viewed area located from 3 or 5 miles to infinity from the viewer. (See "Foreground" and "Middleground".)

Beach Fringe
The area inland from salt water shorelines, which is typically forested.

Best Management Practice (BMP)
Practices used for the protection of water quality. BMPs are designed to prevent or reduce the amount of pollution from nonpoint sources or other adverse water quality impacts while meeting other goals and objectives. BMPs are standards to be achieved, not detailed or site- specific prescriptions or solutions. BMPs as defined in the USDA Forest Service Soil & Water Conservation Handbook are mandated for use in Region 10 under the Tongass Timber Reform Act.

Biological Diversity (Biodiversity)
The variety of life in all its forms and at all levels. This includes the various kinds and combinations of: genes; species of plants, animals, and microorganisms; populations; communities; and ecosystems. It also includes the physical and ecological processes that allow all levels to interact and survive. The most familiar level of biological diversity is the species level, which is the number and abundance of plants, animals, and microorganisms.

Blowdown
See windthrow.

Board Foot (BF)
A unit of wood 12" X 12" X 1". One acre of commercial timber in Southeast Alaska on the average yields 28,000-34,000 board feet per acre (ranging from 8,000-90,000 board feet per acre). One million board feet (MMBF) would be the volume of wood covering 1 acre 2 feet thick. One million board feet yields approximately enough timber to build 120 houses or 75,555 pounds of dissolving pulp.

Buffer
An area around a resource where timber harvest is restricted or prohibited. For example, the Tongass Timber Reform Act (TTRA) requires that timber harvest be prohibited in an area no less than 100 feet on each side of all Class I streams and Class II streams which flow directly into Class I streams. This 100-foot area is known as a "stream buffer".

CCF
One-hundred cubic feet net sawlog and utility volume.

Capability
An evaluation of a resource's inherent potential for use.

Clearcut
The harvesting in one cut of all trees on an area. The area harvested may be a patch, strip, or stand large enough to be mapped or recorded as a separate class in planning for sustained yield. Clearcut size on the Tongass National Forest is limited to 100 acres, except for specific conditions noted in the Alaska Regional Guide.

Code of Federal Regulations (CFR)
A codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.

Commercial Forest Land (CFL)
Productive Forest land that is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and generally capable of producing in excess of 20 cubic feet per acre of annual growth or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

Normal CFL: Timber that can be economically harvested with locally available logging systems. Composed of two categories:

Standard: Timber that can be economically harvested with locally available logging systems, such as highlead or short-span skyline.

Special: Timber that is in areas where special consideration is needed to protect other resources but can be harvested with locally available logging systems.

Non-standard CFL: Timber that cannot be harvested with locally available logging systems and would require the use of other logging systems such as helicopter or long-span skyline.

Commercial Thinning
Thinning a stand where the trees to be removed are large enough to sell.

Connectivity
A measure of the extent that forest areas between or outside reserves provide habitat for breeding, feeding, dispersal, and movement.

Corridor
Connective links of certain types of vegetation between patches of suitable habitat which are necessary for certain species to facilitate movement of individuals between patches of suitable habitat. Also refers to transportation or utility rights-of-way.

Cover
Refers to trees, shrubs, or other landscape features that allow an animal to partly or fully conceal itself.

Critical Habitat
Specific terrain within the geographical area occupied by threatened or endangered species. Physical and biological features that are essential to conservation of the species and which may require special management considerations or protection are found in these areas.

Crown
The tree canopy. The upper part of a tree or woody plant that carries the main branch system and foliage.

Cubic Foot (CF)
Equivalent to a cube of wood with 1-foot sides. The cubic foot volume is a measure of the total sound wood in a tree and is a more accurate depiction of wood volume than the board foot measure.

Cumulative Effects
The impacts on the environment resulting from additional incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

Deer Winter Habitat
Locations that provide food and shelter for Sitka black-tail deer under moderately severe to severe winter conditions.

Developed Recreation
Recreation that requires facilities that, in turn, result in concentrated use of an area. Facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, and buildings.

Dissolved Oxygen
The amount of free (not chemically combined) oxygen in water.

Diversity
The distribution and abundance of different plant and animal communities and species within the area controlled by the modified 1997 Forest Plan.

Draft Environmental Impact Statement (Draft EIS)
A statement of environmental effects for a major Federal action which is released to the public and other agencies for comment and review prior to a final management decision. Required by Section 102 of the National Environmental Policy Act (NEPA).

Eagle Nest Tree Buffer Zone
A 330-foot radius around eagle nest trees established in an agreement between the U.S. Fish and Wildlife Service and the Forest Service.

Ecosystem
A community of organisms and its physical setting. An ecosystem, whether a fallen log or an entire watershed, includes resident organisms, non-living components such as soil nutrients, inputs such as rainfall, and outputs such as organisms that disperse to other ecosystems.

Effects
Effects, impacts, and consequences as used in this environmental impact statement are synonymous. Effects may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historical, cultural, economic, or social, and may be direct, indirect, or cumulative.

Direct Effects: Results of an action occurring when and where the action takes place.

Indirect Effects: Results of an action occurring at a location other than where the action takes place and/or later in time, but in the reasonably foreseeable future.

Cumulative Effects: See Cumulative Effects.

Endangered Species
Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as Endangered in accordance with the 1973 Endangered Species Act. See also Threatened Species, Sensitive Species.

Erosion
The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities.

Estuary
For the purpose of this EIS process, estuary refers to the relatively flat, intertidal, and upland areas generally found at the heads of bays and mouths of streams. They are predominately mud and grass flats and are unforested except for scattered spruce or cottonwood.

Even-aged Management
The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of that age of the stand at harvest rotation age. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

Executive Order
An order or regulation issued by the President or some administrative authority under his or her direction.

Final Environmental Impact Statement (Final EIS)
The final version of the statement of environmental effects required for major Federal actions under Section 102 of the National Environmental Policy Act. It is a revision of the draft environmental impact statement (Draft EIS) to include public and agency responses to the draft. The decision maker chooses which alternative to select from the Final EIS, and subsequently issues a Record of Decision (ROD).

Floodplain
That portion of a river valley, adjacent to the river channel, which is covered with water when the river overflows its banks at flood stages.

Foreground
The stand of trees immediately adjacent to a scenic area, recreation facility, or forest highway; area located less than 1/4 mile from the viewer. See also Background and Middleground.

Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA)
Amended in 1976 by the National Forest Management Act. See RPA Assessment and Program.

Forest or Forest Land
National Forest lands currently supporting or capable of supporting forests at a density of 10 percent crown closure or better. Includes all areas with forest cover, including old growth and second growth, and both commercial and non-commercial forest land.

Forest Plan
The Tongass Land Management Revision, signed in 1997, revised 1999. This is the 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning, the daily uses, and the activities carried out within the Forest.

Fragmentation
An element of biological diversity that describes the natural condition of habitats in terms of the size of discrete habitat blocks or patches, their distribution, the extent to which they are interconnected, and the effects of

management on these natural conditions. Also the process of reducing the size and connectivity of stands within a forest.

Forested Wetland
A wetland whose vegetation is characterized by an overstory of trees that are 20 feet or taller.

FSH
Forest Service Handbook.

FSM
Forest Service Manual.

Geographic Information System (GIS)
An information processing technology to input, store, manipulate, analyze, and display spatial and attribute data to support the decision-making process. It is a system of computer maps with corresponding site-specific information that can be electronically combined to provide reports and maps.

Geomorphology
The study of the forms of the land surface and the processes producing them. Also the study of the underlying rocks or parent materials and the landforms present which were formed in geological time.

Groundwater
Water within the earth that supplies wells and springs.

Guideline
A preferred or advisable course of action or level of attainment designed to promote achievement of goals and objectives.

Habitat
The sum total of environmental conditions of a specific place occupied by an organism, population, or community of plants and animals.

Habitat Capability
The number of healthy animals that a habitat can sustain. Used in wildlife models to calculate rough population estimates for management indicator species.

Heritage Resources (Cultural Resources)
Historic or prehistoric objects, sites, buildings, structures, and their remains, resulting from past human activities.

Interdisciplinary Team (IDT)
A group of people with different backgrounds assembled to research, analyze, and write a project Environmental Impact Statement. The team is assembled out of recognition that no one scientific discipline is sufficiently broad enough to adequately analyze a proposed action and its alternatives.

Issue
A point, matter, or section of public discussion or interest to be addressed or decided.

Land Allocation
The decision to use land for various resource management objectives to best satisfy the issues, concerns and opportunities and meet assigned forest output targets.

Land Use Designation
A defined area of land specific to which management direction is applied in the revised Forest Plan.

Landslides
The moderately rapid to rapid down slope movement of soil and rock materials that may or may not be water-saturated.

Large Woody Debris
Any large piece of relatively stable woody material having a diameter of at least 4 inches and a length greater than 3 feet that intrudes into the stream channel. Also called Large Organic Debris (LOD).

Log Transfer Facility (LTF)
A facility that is used for transferring commercially-harvested logs to and from a vessel or log raft, or the formation of a log raft. It is wholly or partially constructed in waters of the United States and location and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed "terminal transfer facility" or "log dump".

Logging Systems
Long-span cable: Single span cable yarding system with a long corner exceeding 1000 feet, horizontal distance. Typically, this includes a variety of live skyline systems, including standing skylines and running skylines where reach is long.

Short-span cable: All cable systems with a longer corner of not more than 1000 feet, horizontal distance. Typically, this includes running skyline with a carriage and chokers, running skyline with grapple, live skyline with gravity return, and highlead.

Shovel: The process of forwarding logs from stump to landing by repeated swinging of logs by a hydraulic excavator-based log loader.

Helicopter: Flight path cannot exceed 40 percent downhill or 30 percent uphill; landings must be selected so there is adequate room for the operation and so that the helicopter can make an upwind approach to the drop zone.

MBF
A thousand board feet net sawlog and utility volume.

MMBF
A million board feet net sawlog and utility volume.

Management Indicator Species (MIS)
Species selected in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.

Management Prescriptions
Method of classifying land uses presented in the 1997 Tongass Land and Resource Management Plan (TLRMP (modified 1999)). Replaces the land use designations originally presented in the Forest Plan.

Management Requirement
Standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, and soil and water and diversity, to be met in accomplishing National Forest System goals and objectives (see 36 CFR 219.17).

Mass Movement
The downslope movement of a block or mass of soil. This usually occurs under conditions of high soil moisture and does not include individual soil particles displaced as surface erosion.

McGilvery (Soil Series)
Soil series which represents the only well-drained organic soil found in the Ketchikan Area. It is composed of a thin surface layer (less than 8 inches deep) of organic material overlying bedrock. These soils are associated with cliffs and rock outcrops, and are sensitive to disturbance.

Memorandum of Understanding (MOU)
A legal agreement between the Forest Service and others agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project. A memorandum of understanding is not a fund obligating document.

Microclimate
The temperature, moisture, wind, pressure, and evaporation (climate) of a very small area that differs from the general climate of the larger surrounding area.

Middleground
The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly for the landscape; area located from 1/4 to 5 miles from the viewer. See also Foreground and Background.

Mineral Soils
Soils consisting predominately of, and having its properties determined by, mineral material.

Mining Claims
A geographic area of the public lands held under the general mining laws in which the right of exclusive possession is vested in the locator of a valuable mineral deposit.

Mitigation
Measures designed to counteract environmental impacts or to make impacts less severe. These may include: avoiding an impact by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

Mixed Conifer
In Southeast Alaska, mixed conifer stands usually consist of western hemlock, mountain hemlock, Alaska yellowcedar, Western redcedar, and Sitka spruce species. Shore pine may occasionally be present depending on individual sites.

Model
A representation of reality used to describe, analyze, or understand a particular concept. A model may be a relatively simple qualitative description of a system or organization, or a highly abstract set of mathematical equations. A model has limits to its effectiveness, and is used as one of several tools to analyze a problem.

Monitoring
A process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized. Monitoring can occur at different levels: to confirm whether mitigation measures were carried out in the manner called for, to determine whether the mitigation measures were effective, or to validate whether overall goals and objectives were appropriate. Different levels call for different methods of monitoring.

Multiple-aged Stands
An intermediate form of stand structure between even and uneven-aged stands. These stands generally have two or three distinct tree canopy levels occurring within a single stand.

Multiple Use
The management of all the various renewable resources of the National Forest System to be used in the combination that will best met the needs of the American people.

Muskeg
In Southeast Alaska, a type of bog that has developed over thousands of years in depressions or flat areas on gentle to steep slopes. Also called peatlands.

National Environmental Policy Act (NEPA) of 1969
An Act to declare a national policy which will encourage productive and enjoyable harmony between humankind and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality (The Principal Laws Relating to Forest Service Activities, Agricultural Handbook 453. USDA Forest Service, 359 pp.).

National Forest Management Act (NFMA)
A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act requiring the preparation of Regional Guides and Forest Plans and the preparation of regulations to guide that development.

Native Selection
Application by Native corporations and individuals to a portion of the USDI Bureau of Land Management for conveyance of lands withdrawn in fulfillment of Native entitlements established under ANSCA.

No-action Alternative
The most likely condition expected to exist in the future if current management direction were to continue unchanged.

Non-commercial Forest Land
Land with more than 10 percent cover of commercial tree species but not qualifying as Commercial Forest Land.

Non-commercial species
Species that have no economic values at this time nor anticipated timber value within the near future.

Notice of Intent (NOI)
A notice printed in the Federal Register announcing that an Environmental Impact Statement will be prepared. The NOI must describe the proposed action and possible alternatives, describe the agency's proposed scoping process, and provide a contact person for further information.

Objectives
The precise steps to be taken and the resources to be used in achieving goals.

Offering
A Forest Service specification of timber harvest units, subdivisions, roads, and other facilities and operations to meet the requirements of a contract.

Old Growth
Ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of forest stand development that typically differ from earlier stages in a variety of characteristics which may include larger tree size, higher composition, and different ecosystem function. The structure and function of an old-growth ecosystem will be influenced by its stand size and landscape position and context.

Organic Soils
Soils that contain a high percentage (generally greater than 20 to 30 percent) of organic matter throughout the soil depth.

Patch
A non-linear surface area differing in appearance from its surroundings.

Payments to States
A fund consisting of approximately 25 percent of the gross annual timber receipts received by the National Forests in that State. This is returned to the State for use on roads and schools.

Planning Area
The area of the National Forest System controlled by a decision document.

Planning Record
A system that records decisions and activities that result from the process of developing a forest plan, revision, or significant amendment.

Plant Communities
Aggregations of living plants having mutual relationships among themselves and to their environment. More than one individual plant community.

Population Viability
Ability of a population to sustain itself.

Present Net Value (PNV)
The difference between the benefits and costs associated with the alternatives.

Process Group
A combination of similar channel types based on major differences in landform, gradient, and channel shapes.

Productive Old Growth (POG)
Old-growth forest capable of producing at least 20 cubic feet of wood fiber per acre per year, or having greater than 8,000 board feet per acre.

Public Participation
Meetings, conferences, seminars, workshops, tours, written comments, responses to survey questionnaires, and similar activities designed and held to obtain comments from the public about Forest Service activities.

Receipts
Those priced benefits for which money will actually be paid to the Forest Service: recreation fees, timber harvest, mineral leases, and special use fees.

Record of Decision
A document separate from but associated with an Environmental Impact Statement which states the decision, identifies all alternatives, specifying which were environmentally preferable, and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and if not, why not.

Reforestation
The natural or artificial restocking of an area with trees.

Regeneration
The process of establishing a new crop of trees on previously-harvested land.

Regional Forester
The Forest Service official responsible for administering a single region.

Resident Fish
Fish that are not anadromous and that reside in freshwater on a permanent basis. Resident fish include non-anadromous Dolly Varden char and cutthroat trout.

Resource Values
The tangible and intangible worth of forest resources.

Responsible Official
The Forest Service employee who has the delegated authority to make a specific decision.

Revegetation
The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of reforestation or reseeding.

Riparian Area
Area with distinctive resource values and characteristics that contain elements of aquatic and riparian ecosystems, which can be geographically delineated.

Roads
Classified: Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service (36 CFR 212.1).

Temporary: For National Forest timber sales, temporary roads are constructed to harvest timber on a one-time basis. These logging roads are not considered part of the permanent forest transportation network and have stream crossing structures removed, erosion measures put into place, and the road closed to vehicular traffic after harvest is completed.

Roadless Area
An area of undeveloped public land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.

Rotation
The planned number of years (approximately 100 years in Alaska) between the time that a forest stand is regenerated and its next cutting at a specified stage of maturity.

Rotation Age
The age of a stand when harvested at the end of a rotation.

RPA Assessment and Program
The RPA Assessment is prepared every 10 years and describes the potential of the nation's forests and rangelands to provide a sustained flow of goods and services. The RPA Program is prepared every 5 years to chart the long-term course of Forest Service management of the National Forests, assistance to State and private landowners, and research. They are prepared in response to Sections 3 and 4 of the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) (16 U.S.C. 1601).

Scheduled Timber Harvests
Timber harvests done as part of meeting the allowable sale quality.

Scoping Process
Early and open activities used to determine the scope and significance of a proposed action, what level of analysis is required, what data is needed, and what level of public participation is appropriate. Scoping focuses on the issues surrounding the proposed action, and the range of actions, alternatives, and impacts to considered in an EA or an EIS.

Scrub-Shrub Wetland
Wetlands dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. In Southeast Alaska this includes forested lands where trees are stunted because of poor soil drainage.

Second Growth
Forest growth that has become established following some disturbance such as cutting, serious fire, or insect attack; even-aged stands that will grow back on a site after removal of the previous timber stand.

Sediment
Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface.

Seed Tree
Small number of seed-bearing trees left singly or in small groups after timber harvest to provide seed for regeneration of the site.

Selection Harvest
The annual or periodic removal of trees (particularly the mature), individually or in small groups from an uneven-aged forest to achieve the balance among diameter classes needed for sustained yields, and in order to realize the yield, and establish a new crop of irregular constitution. Note: The improvement of the forest is a primary consideration.

Sensitive Species
Plant and animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Those species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on a non-official State list, or that are recognized by the Regional Forester as needing special management to prevent placement on Federal or State lists.

Shelterwood Cutting
A harvest method in which most of the trees are removed in an initial entry and some trees are left to naturally reseed the area and provide protection to new seedlings that establish on the site. A second entry is conducted later to remove the remaining trees.

Silviculture
The science of controlling the establishment, composition, and growth of forests.

Smolt
Young silvery-colored salmon or trout which move from freshwater streams to saltwater.

Snag
A standing dead tree, usually greater than 5 feet tall and 6 inches in diameter at breast height.

Soil Productivity
The capacity of a soil, in its normal environment, to produce a specific plant or sequence of plants under a specific system of management.

Soil Quality Standards
Standards that are a combination of 1) "threshold" values for severity of soil property alteration, or significant change in soil properties conditions, and 2) a real extent of disturbance.

Split Yarding
The process of separating the direction of timber harvest yarding into opposite directions.

Stand (Tree Stand)
An aggregation of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the forest in adjoining areas.

Standard
A course of action or level of attainment required by the modified 1997 Forest Plan to promote achievement of goals and objectives.

State Historic Preservation Officer (SHPO)
State-appointed official who administers Federal and State programs for cultural resources.

Stocking
The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard; that is, the basal area or number of trees required to fully use the growth potential of the land.

Stream Class
A mapping unit that displays an identified value for aquatic resources. It is a mechanism for carrying out aquatic resource management policy. Also known as Aquatic Habitat Management Unit (AMHU).

Class I: Streams and lakes with anadromous or adfluvial fish habitat, or high-quality resident fish waters listed in Appendix 68.1, Region 10 Aquatic Habitat Management Handbook (FSH 2609.24), June 1986; or habitat above fish migration barriers known to be reasonable enhancement opportunities for anadromous fish.

Class II: Streams and lakes with resident fish populations and generally steep (6-15 percent) gradient (can also include streams from 0-5 percent gradient) where no anadromous fish occur, and otherwise not meeting Class I criteria. These populations have limited fisheries values and generally occur upstream of migration barriers or have other habitat features that preclude anadromous fish use.

Class III: Perennial and intermittent streams with no fish populations but which have sufficient flow or transport sufficient sediment and debris to have an immediate influence on downstream water quality or fish habitat capability. These streams generally have bankfull widths greater than 5 feet and are highly incised into the surrounding hillslope.

Class IV: Intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality or fish habitat capability. These streams generally are shallowly incised into the surrounding hillslope.

Non-streams: Rills and other watercourses, generally intermittent and less than 1 foot in bankfull width, little or no incisement into the surrounding hillslope, and with little or no evidence of scour.

Stream Order
First-order streams are the smallest unbranched tributaries; second-order streams are initiated by the point where two first-order streams meet; third-order streams are initiated by the point where two second-order streams meet, and so on.

Stumpage
The value of timber as it stands uncut in terms of dollar value per thousand board feet.

Subsistence
Section 803 of the Alaska National Interest Lands Conservation Act defines subsistence use as, "the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible by-products of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

Subsistence Use Area
Important Subsistence Use Areas include the "most reliable" and "most often hunted" categories from the Tongass Resource Use Cooperative Survey (TRUCS) and from subsistence survey data from ADF&G, the University of Alaska, and the Forest Service, Region 10. Important use areas include both intensive and extensive use areas for subsistence harvest of deer, furbearers, and salmon.

Substrate
The type of material in the bed (bottom) of rivers and streams.

Succession
The ecological progression of community change over time, characterized by displacements of species leading towards a stable climax community.

Suitable
Commercial forest land identified as having both the biological capability and availability to produce industrial wood products.

Suitable Forest Land
Forest land for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions, and for which there is reasonable assurance that such lands can be adequately restocked, and for which there is management direction that indicated that timber production is an appropriate use of that area.

Suspended Sediment
The very fine soil particles which remain in suspension in water for a considerable period of time without contact with the stream or river channel bottom.

Sustained Yield
The amount of renewable resources that can be produced continuously at a given intensity of management.

Thinning
The practice of removing some of the trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may also be done to change the characteristics of a stand or wildlife or other purposes. Thinning may be done at two different stages.

Threatened Species
Plant or animal species which is likely to become endangered throughout all or a significant portion of its range within the foreseeable future, as defined in the Endangered Species Act of 1973, and which has been designated in the Federal Register by the Secretary of the Interior as a Threatened Species. See also Endangered Species, Sensitive Species.

Timber Appraisal
Establishing the fair market value of timber by taking the selling value minus manufacturing costs, the cost of getting logs from the stump to the manufacturer, and an allowance for profit and risk.

Timber Classification
Forested land is classified under each of the land management alternatives according to how it relates to be management of the timber resource. The following are definitions of timber classifications used for this purpose.

Nonforest: Land that has never supported forests and land formerly forested where use for timber production is precluded by development or other uses.

Forest: Land at least 10 percent stocked (based on crown cover) by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use.

Suitable or suitable available: Land to be managed for timber production on a regulated basis.

Unsuitable: Forest land withdrawn from timber utilization by statute or administrative regulation (for example, wilderness), or identified as inappropriate for timber production in the Forest planning process.

Commercial forest: Forest land tentatively suitable for the production of continuous crops of timber and that has not been withdrawn.

Timber Harvest Unit
A "Timber Harvest Unit" is a portion of a timber sale within which Forest Service specifies for harvest all or part of the timber to meet the requirements of a timber sale contract.

Tongass Land and Resource Management Plan (Forest Plan)
The 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning, the daily uses, and the activities carried out within the Forest.

Understory
The trees and shrubs in a forest growing under the canopy or overstory.

Uneven-aged Management
Forest management techniques which simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes.

Unsuitable
Forest land withdrawn from timber utilization by statute or administrative regulation; for example, Wilderness, or identified as not appropriate for timber production in the forest planning process.

Value Comparison Unit (VCU)
Areas which generally encompass a drainage basin containing one or more large stream systems; boundaries usually follow easily recognizable watershed divides. Established to provide a common set of areas where resource inventories could be conducted and resource interpretations made.

Viable Population
The number of individuals of a species required to ensure the long-term existence of the species in natural, self-sustaining populations adequately distributed throughout their region.

Viewshed
An expansive landscape or panoramic vista seen from a road, marine waterway, or specific viewpoint.

Visual Quality Objectives (VQO)
Measurable standards reflecting five different degrees of landscape alteration based upon a landscape's diversity of natural features and the public's concern for high scenic quality. The five categories of VQOs are:

Preservation: Permits ecological changes only. Applies to Wilderness areas and other special classified areas. Management activities are generally not allowed in this setting.

Retention: Provides for management activities that are not visually evident to the casual forest visitor.

Partial Retention: Management activities remain visually subordinate to the natural landscape.

Modification: Management activities may visually dominate the characteristics landscape. However, activities must borrow from naturally-established form-line color and texture so that the visual characteristics resemble natural occurrences within the surrounding area when viewed in the middleground distance.

Maximum Modification: Management activities may dominate the landscape but should appear as a natural occurrence when viewed as background.

V-Notches
A deeply incised valley along some waterways that would look like a "V" from a cross-section. These abrupt changes in terrain features are often used as harvest unit or yarding boundaries.

Volume
Stand volume based on standing net board feet per acre by Scribner Rule.

Volume Strata
Categories of timber volume derived from the timber type data layer (TIMTYP) and the common land unit data layer (CLU). Three volume strata (low, medium, and high) are recognized in the Forest Plan.

Low Strata: The lowest range of volume for commercial forest land based on per acre volume estimates. The Forest Plan estimated the low volume class strata to contain approximately 13.9 MBF/Acre.

Medium Strata: The middle range of volume for commercial forest land based on per acre volume estimates. The Forest Plan estimated the medium volume class strata to contain approximately 23.3 MBF/Acre.

High Strata: The high range of volume for commercial forest land based on per acre volume estimates. The Forest Plan estimated the high volume class strata to contain approximately 29.9 MBF/Acre.

Watershed
The area that contributes water to a drainage or stream. Portion of the forest in which all surface water drains to a common point. Watersheds can range from a few tens of acres that drain a single small intermittent stream to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams.

Wetland
Areas that are inundated by surface or groundwater frequently enough to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include: swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds. See the modified 1997 Forest Plan pp. 3-318 and 3-321 for detailed discussion on wetland type definitions.

Wilderness
Areas designated by congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or a primitive and unconfined type of recreation; areas of at least 5,000 acres are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest. In Alaska, Wilderness has been designated by ANILCA and TTRA.

Wildlife Analysis Area (WAA)
A division of land used by the Alaska Department of Fish and Game for wildlife analysis.

Wildlife Habitat
The locality where a species may be found and where the essentials for its development and sustained existence are obtained.

Windfirm
Trees that have been exposed to the wind throughout their life and have developed a strong root system or trees that are protected from the wind by terrain features.

Windthrow
The act of trees being uprooted by the wind. In Southeast Alaska, Sitka spruce and hemlock trees are shallow rooted and susceptible to windthrow. There generally are three types of windthrow:

Endemic: where individual trees are blown over;

Catastrophic: where a major windstorm can destroy hundreds of acres; and

Management Related: where the clearing of trees in an area make the adjacent standing trees vulnerable to windthrow.

Winter Range
An area, usually at lower elevation, used by big game during the winter months; usually smaller and better-defined than summer ranges.

Yarding
Hauling timber from the stump to a collection point.

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Appendix A

Reasons for Scheduling the Environmental Analysis of the Emerald Bay Project Area Timber Sale

Appendix A

Reasons for Scheduling the Environmental Analysis of the Emerald Bay Timber Sale

Table of Contents

Introduction

This appendix provides an explanation of the rationale for a specific timber harvest project and its importance to the multi-year timber program on the Tongass National Forest. To accomplish this, the following questions are answered:

- Why is timber from the Tongass National Forest being offered for sale?
- What steps must be completed to prepare a sale for offer?
- How does the Forest Service develop expectations about the market demand for timber?
- How does the Forest Service maintain an orderly and predictable timber sale program?
- How does the Forest Service decide where timber sale projects should be located?
- How does this project fit into the Tongass timber program?
- Why can't this project be located somewhere else?

Coordinated timber sale planning is essential for meeting the goals of the Tongass Land Management Plan and to provide an orderly flow of timber to local industry. To determine the volume of timber to offer each year, the Forest Service can look to current market conditions and the level of industry operations. However, the lengthy planning process, of which this document is a part, requires the Forest Service to rely on projections of future harvest levels to decide how many timber sale projects to begin each year. This document explains how the Forest Service uses information about future markets and past experience with the logistics of timber sale planning to determine the volume of timber that needs to be started through this process each year. Using a timber sale schedule that provides information about each sale as it moves through each stage of the planning process, this appendix explains the rationale and the necessity for completing this particular timber sale project at this time. This appendix is updated annually after the ten-year timber sale schedule is approved by the Forest Supervisor.

Why is Timber from the Tongass National Forest Being Offered for Sale?

National Legislation

On a national level, the legislative record is very clear about the role of the timber program in the multiple-use mandate of the national forests. The Organic Act of 1897, 16 USC 473-481 (partially repealed in 1976) directed the agency to manage the forests in order to "improve and protect the forest ... [and] for the purpose of securing favorable conditions of water flows, and to *furnish a continuous supply of timber* for the use and necessities of the citizens

of the United States" (emphasis added). The Multiple-Use Sustained Yield Act of 1960, 16 U.S.C. 528-531, directs the Forest Service to administer federal lands for "outdoor recreation, range, timber, watershed, and wildlife and fish purposes."

The National Forest Management Act (NFMA) of 1976 (16 U.S.C. 472a) states that "the Secretary of Agriculture...[may sell, at not less than appraised value, trees, portions of trees, or forest products located on National Forest System Lands]." Although the heart of the Act is land management planning, the Act also sets policy direction for timber management and public participation in Forest Service decision-making. Under NFMA, the Forest Service was directed to "limit the sale of timber from each national forest to a quantity equal to or less than a quantity which can be removed from such forest annually in perpetuity on a sustained-yield basis" (16 U.S.C. 1611).

NFMA directs the Forest Service to complete land management plans for all units of the National Forest System. Forest Plans are developed by an interdisciplinary team to provide for the coordination of outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness. These plans allocate certain parts of national forest for certain uses.

Alaska-Specific Legislation

Legislation unique to Alaska also directs the Forest Service to maintain a commercial timber program. The Alaska National Interest Lands Conservation Act (ANILCA; P.L. 96-487, 1980) and the Tongass Timber Reform Act (TTRA; P.L. 101-625, 1990) speak directly to the issue of Tongass timber supply. Section 705(a) of ANILCA directed the Forest Service to maintain a timber supply from the Tongass at a rate of 4.5 billion board feet per decade. To ensure that the timber target was met, Congress provided for a $40 million annual earmark to fund pre-roading, cultural treatments and innovated logging systems.

Section 101 of TTRA repealed the timber supply mandate and fixed appropriations of ANILCA and replaced them with the following more general direction:

> Sec. 705. (a), Subject to appropriations, other applicable law, and the requirements of the National Forest Management Act (P.L. 94-588); except as provided in subsection 9d) of this section, the Secretary shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the annual market demand from such forest for each planning cycle.

Timber from the Tongass National Forest is being offered as part of the multiple-use mission of the Forest Service as identified in public laws. Alaska-specific legislation and the Forest Plan direct the Forest Service to seek to provide timber to meet market demand subject to appropriations and balancing of forest uses.

Tongass National Forest Land and Resource Management Plan (Forest Plan, 1997, as amended)

The 1979 *Tongass National Forest Land Management Plan* (TLMP) was the first Forest Plan to be completed. This Forest Plan was scheduled for revision in the late 1980's. This revision incorporated new resource information and scientific studies and went through an intensive public involvement process. The Record of Decision for the revised Forest Plan (*Tongass National Forest Land and Resource Management Plan)* was issued in 1997. This decision was modified in 1999. Subsequently, Alaska Federal Court Judge James K. Singleton vacated the 1999 Forest Plan Record of Decision in a March 30, 2001 court decision. The 1997 Record of Decision is now in effect. Since then, amendments have been made to the 1997 Forest Plan, primarily to modify small Old-growth Habitat Reserves to meet Forest Plan, Appendix K criteria. These amendments have been accomplished with environmental analysis and are documented in decision documents. In certain areas, Land Use Designations have changed from development LUDs that allow timber harvest to Old-growth Habitat LUD or changed from the Old-growth Habitat LUD to development LUDs.

Alaska Federal Court Judge Singleton also directed the Forest Service to supplement the 1997 Forest Plan Final EIS to further evaluate the wilderness values of Inventoried Roadless Areas and make any necessary changes to the prescribed Land Use Designations. The Record of Decision for this Supplemental Environmental Impact Statement was signed in February 2003. The No-action Alternative was selected; no additional lands were recommended for Wilderness designation and no changes were made to the Land Use Designations from the 1997 Record of Decision, as amended.

With regard to timber production, the Record of Decision for the 1997 Plan states: "The Tongass National Forest will continue to allow timber harvest consistent while maintaining sustained yield and multiple use goals." The maximum amount of timber that could be harvested (Allowable Sale Quantity or ASQ) during the first decade of the 1997 Forest Plan implementation is an average of 267 MMBF per year. (The SEIS for the Forest Plan estimated that the ASQ would be 259 MMBF, as a result of changes in Land Use Designations, such as Old-growth Reserves and land ownership.) A timber volume level less than the ASQ is likely to be offered over the next few years, given current market conditions, the transition that both the timber industry and the Forest Service are experiencing, and the current amount of appeals and litigation.

The timber resource will be managed for production of sawtimber and other wood products from timberlands available for sustainable timber harvest, on an even-flow, sustained-yield basis and in an economically efficient manner. The Tongass National Forest will seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber and the market demand for the planning cycle.

The Tongass National Forest will continue to allow timber harvest while maintaining sustained yield and multiple-use goals. The forest-wide standards

and guidelines for timber include general direction to "[e]nsure that silvicultural systems other than clearcutting are considered through an appropriate project level analysis process. However, uneven-aged management systems will be limited to areas where yarding equipment suited to selective logging can be used..."

Forest-wide, considering all land allocations where timber harvest is permitted, it is estimated that 65 percent of harvesting will involve clearcutting, with the remaining 35 percent utilizing other methods."

In the operation of the Tongass timber program, the Forest Service attempts to strike a balance among timber availability as documented in the Forest Plan, the market demand for timber in Southeast Alaska, the needs and desires of other forest users, and funding allocations made by Congress. The analysis for the Emerald Bay Timber Sale was completed to comply with the direction in the 1997 Tongass Land and Resource Management Plan (Forest Plan). The effects for the Forest Plan were analyzed as if the maximum timber harvesting allowed by the Forest Plan will occur over the next decade and into the future. This displayed the maximum amount of environmental impacts that could be reasonably foreseen. It is likely that the impacts will be less, since less timber has been harvested in the first 7 years of implementation (Table A-1) than what was projected to occur in the Forest Plan.

Roadless Area Conservation Rule

The Roadless Area Conservation Rule (Roadless Rule, January 2001) generally prohibited timber harvest and road construction in inventoried roadless areas on National Forest System lands. Effective January 29, 2004, the Tongass National Forest is temporarily exempted from the prohibitions against timber harvest and road construction within Inventoried Roadless Areas. This temporary exemption of the Tongass will be in effect until the USDA promulgates a subsequent final rule concerning the application of the Roadless Rule within the State of Alaska. An analysis to the effects to Inventoried Roadless Areas within the project area has been included as part of the analysis for this project.

What Steps Must Be Completed to Prepare a Sale for Offer?

The timber sale program is complex. A number of projects are underway at any given point in time, each of which may be in a different stage of planning and preparation. A system of checkpoints, or "gates " (FSH 2409.18), helps the Forest Service track the accomplishments of each stage of a project from inception to contract termination.

Gate 1 - Completion of Position Statement

The Position Statement is a brief analysis of the project area with the intent of determining the feasibility of the potential timber sale. This is the first step in the timber sale planning process and it is usually completed from 7 to 10 years

before a sale is offered. After the Position Statement is developed, the Forest Service decides whether to continue to the next phase of the project where an investment in time and money will be made.

Gate 2 – Sale Area Design, Environmental Documentation, and Decision

This phase of the project is commonly referred to as the "NEPA" phase and includes inventory, public scoping, analysis, draft disclosure of the effects of the project on the environment, public comment, final analysis and disclosure, decision, potential appeal, and potential litigation. Gate 2 activities are generally completed 2 to 6 years before a sale is offered. Legislation and policy changes and appeals and litigation have recently delayed some projects to a much longer timeframe. The product of Gate 2, an environmental decision document, forms the starting point for the next phase.

Gate 3 – Plan Implementation and Field Layout

During this phase, the information and direction included in the decision document (Gate 2) is used to designate the actual project on the ground. Additional site-specific information is collected at this time. Gate 3 activities are typically completed 1 to 3 years before a sale is offered.

Gate 4 – Appraisal

The costs and value associated with the timber sale designed in Gate 3 are computed and packaged in a timber sale contract. The contract tells the prospective timber sale purchaser how the sale must be harvested to be in conformance to the project decision document. This occurs during the final year of the project development and culminates with the advertisement of the project for sale.

Gate 5 – Bid Opening

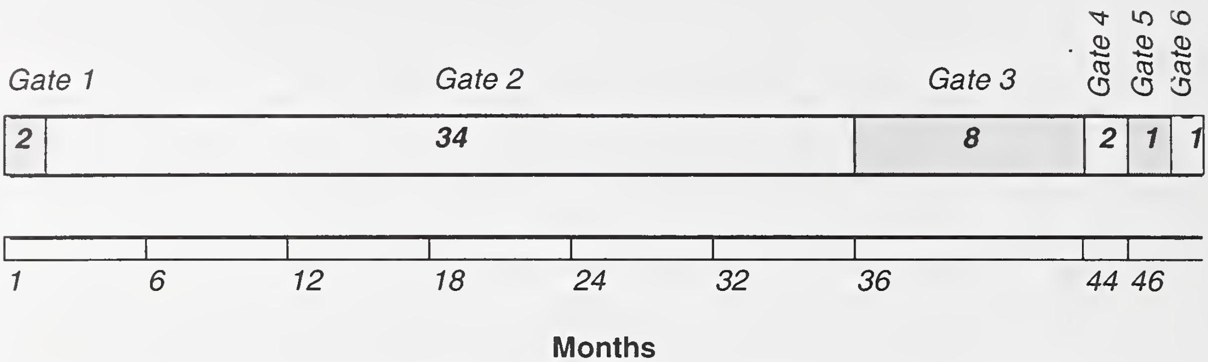
Gate 5 is completed with the opening of bids for the project. If a bid is submitted, contractual provisions govern when the award of the sale takes place, when the sale will be completed (contract length and operation season), and how timber removal is to occur.

Gate 6 - Award

Gate 6 is the formal designation of a contract between a bidder and the Forest Service.

Figure A-1
Average Timeline for the Gate System

Average Timeline for the Gate System through Award



Gate 1 – Completion of Project Plan
Gate 2 –Environmental Analysis, Documentation and Decision
Gate 3 – Project Implementation and Field Layout
Gate 4 – Appraisal Offering Package
Gate 5 – Bid Opening
Gate 6 – Award

* Source: Alaska Regional Office unpublished data, (Region 10 2002 Planning Workshop)

How does the Forest Service Develop Expectations about Future Timber Markets?

The Tongass National Forest makes two determinations on volume to be offered. The first is a determination on volume to be offered for the current year (annual market demand). The annual market demand is analogous to assessing industry performance in the short-term. In the short-run, a firm will make use of its existing equipment to maximize profits or minimize losses. The general approach is to consider the timber requirements of the region's sawmills at different levels of operation and under different assumptions about market conditions and technical processing capability. These assumptions provide a basis for estimating the volume of timber likely to be processed by the industry as a whole in any given year. Timber inventory requirements are acknowledged and estimated in a related calculation. The volume of timber likely to be purchased is equal to the volume needed to make up any inventory shortfall in addition to the volume likely to be harvested in the coming year. The document titled *Evaluating the Demand for Tongass Timber* (Morse 1998) forms the basis for how these estimates were developed. The document titled *Tongass National Forest Timber Sale Procedures* (Morse 2000a) documents actual estimates for the current year. This estimate is what the Tongass plans to offer for the current year of the Ten Year Timber Sale Schedule pending

sufficient funding. Final procedures can be located in the document titled: *Responding to the Market Demand for Tongass Timber* (Morse 2000).

The offer planned could include a combination of new, previously offered, or previously offered and reconfigured timber sales. Both standing timber and salvage will be components of the program. Offerings will consist of those targeted for Small Business qualified firms as well as a portion of the volume being made available for the open market.

Life of the Forest Plan (Market Demand over the Planning Cycle)

For planning purposes, the Forest Service needs to estimate what the long-term timber demand will be, given the cycles in the market. The Pacific Northwest Research Station was asked for professional assistance in assessing the long-term timber demand.

As the Tongass Land and Resource Management Plan was being revised in 1997, research economists at the Pacific Northwest Research Station (PNW) updated their earlier projections of Alaska timber products output and timber harvest by ownership. The most recent projections of timber harvest over the planning cycle account for several dramatic changes in the region's manufacturing capabilities, increased competition from a number of sources, and steady decline of North America's share of Japanese timber markets.

The Forest Service documents these projections and the means of implementation through the issuance of a Ten Year Timber Sale Schedule. Each year this plan is updated whereby the current year is dropped at the culmination of the fiscal year and a new year ten is added. The basis for this schedule is long-range timber market projections documented in the publication titled *Timber Products Output and Timber Harvest in Alaska: Projections for FY97-10* (Brooks and Haynes 1997). These projections of Alaska timber products output, the derived demand for raw material, and timber harvest by owner are developed from a trend-based analysis. These projections reflect the consequences of recent changes in the Alaska forest sector and long-term trends in markets for Alaska products. With the closure of the two Southeast Alaska pulp mills, demand for Alaska's National Forest System timber now depends on markets for sawn wood and the ability to export manufacturing residues and lower-grade logs. Three alternative projections are used to display a range of possible future demand (Table A-1). Areas of uncertainty include the prospect of continuing changes in markets, in conditions faced by competitors, and the speed and magnitude of investment in manufacturing in Alaska.

Demand projections are important for program planning. They provide guidance to the Forest Service to request budgets, to make decisions about workforce and facilities, and to indicate the need to begin new environmental analysis for future program offerings. They also provide a basis for expectations regarding future harvest, and thus provide an important source of information for establishing the schedule of probable future sale offerings. The weight given to the projections will vary depending on a number of factors,

such as how recently they were done and how well they appear to have accounted for recent, site-specific events in the timber market.

Table A-1
Projected National Forest Harvest for Market Demand[1]

Fiscal Year	Projected Harvest (MMBF) Low	Medium	High	Actual
1998	77.3	86.0	112.2	119.8
1999	86.4	99.3	127.9	145.8
2000	95.5	115.9	142.7	146.8
2001	104.6	129.0	157.7	47.8[2]
2002	113.7	134.9	173.1	33.8
2003	122.8	140.8	188.9	50.8
2004	131.9	146.5	205.0	
2005	131.9	152.2	221.4	
2006	131.9	157.8	238.2	
2007	132.0	163.4	255.3	
Average	**112.8**	**132.6**	**182.2**	**90.8**

[1] Table 1 from *Responding to Market Demand for TongassTimber*, Morse, April 2000, R10-MB-413. This schedule is based on the projections documented in *Timber Products Output and Timber Harvest in Alaska: Projections for FY97-10* (Brooks and Haynes 1997), and current volumes in the timber sale pipeline process. Prior to the beginning of each fiscal year the amount of volume to be scheduled in that fiscal year is once again analyzed to determine if the projection meets the anticipated need.

[2] Truncated logging season due to Judge James K. Singleton's Forest Plan Appeal Decision, March 30, 2001.

How does the Forest Service Maintain an Orderly and Predictable Timber Sale Program?

Pools of Timber (Pipeline Volume)

As discussed earlier, the Forest Service tracks the accomplishment of various stages of development of each timber sale with the Gate System process. From a timber sale program standpoint, it is also necessary to track and manage multiple projects through a "pipeline" of time as projects collectively move through the Gate System. Because of the timeframes needed to accomplish a given timber sale and the complexities inherent in timber sale project and

program development, it is necessary to track various timber sale program volumes from Gate 1 through Gate 6. Gate 1 volume represents a large amount of program volume, but represents a relatively low investment from project to project. This relative investment level offers the timber program manager a higher degree of flexibility and thus, does not greatly influence the flow of volume through the pipeline. In addition, tracking how much volume that is in appeals or litigation may be necessary to determine possible effects on the flow of potential timber sales.

The goal of the Tongass National Forest is to provide an even flow of timber sale offerings on a sustained yield basis. In past years, this has been difficult to accomplish due to continual reductions in the suitable timberland base, reductions in the timber industry processing capabilities, rapid market fluctuations, and Forest Plan modifications and litigation. To achieve an even flow of timber sale offerings, 'pools' of volume in various stages of the Gate System are maintained so volume offered can be balanced against current year demand and market cycle projections (*Declaration of Frederick L. Norbury, 1994*).

Today, upward trends in demand are resolved by moving outyear timber projects forward which may leave later years not capable of meeting the needs of the industry. In other instances, a number of new projects are started based on today's market but will not be available for a number of years. By the time the added projects are ready for offer, the market and demand for this volume may have changed. Three pools are being tracked to achieve an even flow of timber sale offerings:

- **Pool 1, Timber volume under analysis (Gate 2):** Timber volume under analysis contains sales being analyzed and undergoing public comment through the NEPA process. This process can often take from 1 to 5 years and ends with a NEPA decision. This pool includes any project with a formal Notice of Intent through those with a decision document issued. Volume in appeals and litigation is tracked as a subset of this pool as necessary (Table A-3).
- **Pool 2, Timber volume available for sale (Gate 3, Gate 4 and Gate 5)**: Timber volume available for sale contains sales for which environmental analysis has been completed, and administrative appeals and litigation (if any) have been resolved. Enough volume in this pool is maintained to be able to schedule future sale offerings in an orderly manner of the size and configuration that best meets the need of the public. As a matter of policy, and sound business practice, the Forest Service announces probable future sale offerings with the Periodic Timber Sale Announcement. At Gate 4, sales have been fully prepared and appraised, and are available to managers to schedule for sale offerings. This allows potential purchasers an opportunity to do their own evaluations of these offerings in order to determine whether to bid, and if so, at what level.

- **Pool 3, Timber volume under contract (Gate 6)**: Timber volume under contract contains sales that have been sold and a contract awarded to a purchaser, but which have not yet been fully harvested. Timber contracts typically, but not always, give the purchaser 3 years to harvest and remove the timber purchased. Contract length is based on the amount of timber in the sale, the current timber demand, and takes into account the accessibility of the area. The longer the contract period the more flexibility the operator has to remove the timber based on market fluctuations. Traditional Forest Service practice is to attempt to maintain about 2 to 3 years of unharvested timber volume under contract to timber purchasers. This volume of timber is the industry's dependable timber supply, which allows immediate flexibility in business decisions. This practice is not limited to the Alaska Region, but is particularly pertinent to Alaska because of the nature of the land base. The relative absence of roads, the island geography, the steep terrain, and the consequent isolation of much of the timber land means that timber purchasers need longer-than-average lead times to plan operations, stage equipment, set up camps, and construct roads prior to beginning harvest.

A combination of actual harvest and projected demand drives the varying timber sale program pipeline pool volume. As purchasers harvest this timber, they deplete the volume under contract. Managers track harvest, and offer sales that give the industry the opportunity to replace this volume and build or maintain their working inventory. Although there can be variation for practical reasons from year to year, in the long-run, over both the high points and low points of the market cycle, timber harvest will equal timber sales.

The Forest Service, based on historical patterns, determines the amount of pipeline volume needing to be maintained in each of the pools.

- Pool 1, Timber Volume under Analysis, should be maintained at approximately 4.5 times the amount of anticipated harvest.
- Pool 2, Timber Volume Available for Sale, should be maintained at approximately 1.3 times the amount of anticipated harvest.
- Pool 3, Volume under Contract, should be maintained at approximately 3 times the amount of anticipated harvest to allow for continuous timber volume to be available.

The objective of the pools concept is to maintain sufficient volume in preparation and under contract to be able to respond to yearly fluctuations in a timely manner. The amount of volume estimated to be harvested for the year sets the basis for what will be maintained in Pools 1-3 (Gates 2 through 6). Should this estimate be incorrect, adjustments can be made in the following years without significant departures in outyear program capabilities. Table A-2 displays the volume levels that are currently in each pool.

Table A-2
Crosswalk between Gate Tracking System (FSH 2409.18) and the concept of Pools of Timber

Pipeline Pool Volume		FY 03	Planned During FY 04	Planned End of FY 04
Pool 1 Volume Under Analysis[1] (Gate 2) (MMBF) *(4.5 times expected harvest)*		370-500[2]	150 [3]	450-520[4]
Pool 2 Volume Available for Sale[5] (Gate 3, Gate 4 and Gate 5) (MMBF) *(1.3 times expected harvest)*	NEPA Cleared	370[6]	70-130[7]	184-334
	Planned Offered	118	176[8]	--
	Sold	36	--	--
Pool 3 Volume Under Contract [9] (Gate 6) (MMBF) *(3 times expected harvest)*	Volume under Contract	193[10]	176[11]	459[12]
	Volume Harvested	51	132[13]	

[1]Gate 2: projects for which an environmental analysis has been started
[2] Estimated Volume range from all alternatives for all NEPA projects
[3]Estimated volume for environmental analysis projects to be started in FY 04
[4]NEPA project volume minus the volume cleared with NEPA decisions planned for FY 04
[5]Gate 3, field preparation work; Gate 4, timber sale contract package preparation; Gate 5, timber sale bid opening.
[6] Estimated Volume cleared from previous NEPA decisions
[7] Possible Volume from NEPA decisions in FY 04 (if action alternaitve is selected)
[8] From Ten-year Timber Sale Schedule. Average ten-year schedule demand using Tongass National Forest Timber Sale Procedures, (Morse 2000a), updated for FY 2004, is 153 mmbf.
[9]Gate 6: Timber sale award and contract execution, based on the Timber Sale Statement of Accounts.
[10]Volume under contract as of September 30, 2003. Conntracts eligible for mutual cancellation under Public Law 108-108 would decrease this amount by 146 mmbf.
[11]Volume planned for sale in FY 04. Tongass National Forest Ten Year Timber Sale Schedule, approved by Forrest Cole, Forest Supervisor, Tongass National Forest, January 12, 2004
[12].If all contracts eligible for mututal cancellation occur, this volume would be 223 mmbf.
[13]Projected harvest from FY04 demand calculation. Projected harvest from the PNW Research Station using the LOW market scenario was 123 mmbf.

Table A-3
Timber Volume in Appeals and/or Litigation – (as of January 12, 2004)

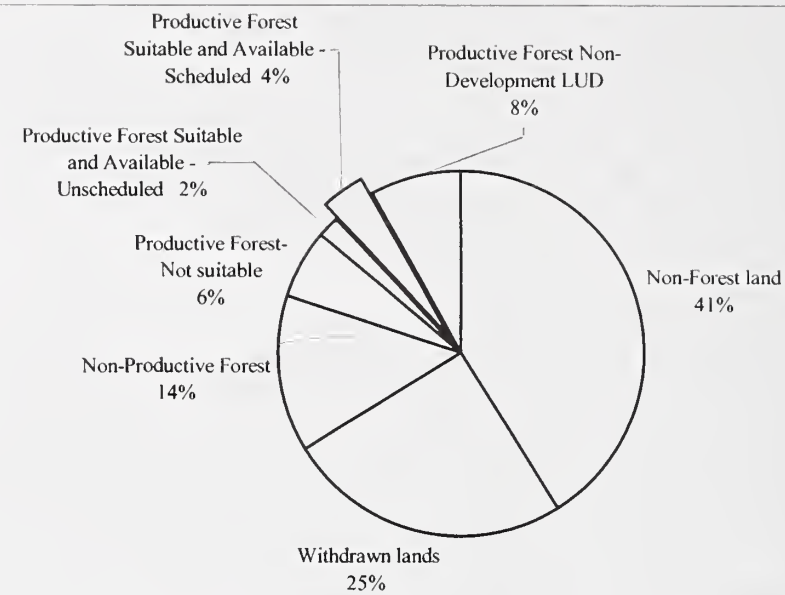
Timber volume remanded on appeals *	35 Million Board Feet
Timber volume enjoined in litigation	234 Million Board Feet

*Does not include those documents currently in the appeal period or undergoing an appeal.

Timber Resource Land Suitability

The chart below depicts the classification of all the lands within the Tongass National Forest. Four percent of the Tongass land base, the productive suitable and available forest land, provides the land base for the Allowable Sale Quantity of 267 MMBF per year. The remainder of the land, approximately 96 percent, does not allow, is not scheduled, or will not support timber harvest activities (based on Forest Plan, Appendix A).

Figure A-2
1997 Forest Plan Timber Resource Suitability Analysis



Non-Forest land – Land that has never supported forests, e.g. muskeg, rock, ice, etc.
Withdrawn Lands – Lands designated by Congress, the Sec. of Agriculture, or Chief for purposes that preclude timber harvest are classified, e.g. Wilderness Areas
Non-productive Forest – Forest land not capable of producing commercial wood on a sustained yield basis
Productive, Non-development LUD – Productive forest lands that where timber production is not allowed due to Forest Plan land use designation e.g. Semi-Remote Recreation, Old-growth Habitat, etc.
Productive Forest Not suitable – Forest land unsuitable for timber due to physical attributes (steep slopes) and/or inadequate information to insure restocking trees (soils).
Productive Forest, Suitable and Available Scheduled – Forest land that meets all the criteria for timber production suitability and is available and is scheduled by the Forest Plan over the rotation
Productive Forest Suitable and Available Unscheduled – Forest land that meets all the criteria for timber production suitability and is available but not scheduled for harvest over the rotation.

Allowable Sale Quantity (ASQ)

The 1997 Forest Plan Record of Decision established an Allowable Sale Quantity (ASQ) for timber at 2.67 billion board feet per decade, which equates to an annual average of 267 million board feet (MMBF) per year. The ASQ serves as an upper limit on the amount of timber that may be offered for sale

each year as part of the regularly scheduled timber sale program. It consists of two separate Non-Interchangeable Components (NICs) called NIC I and NIC II. The NIC I component includes lands that can be harvested with normal logging systems including helicopter logging with less than ¾ mile yarding distance. The NIC II component includes land that has high logging costs due to isolation or special equipment requirements. Most of these NIC II lands are presently considered economically and technically marginal.

There are two purposes of partitioning the ASQ into two components:

- to maintain the economic sustainability of the timber resource by preventing the over-harvest of the best operable ground and
- to identify that portion of the timber supply that is at risk of attainment because of marginal economic conditions.

District-Level Planning

The Tongass National Forest is divided into ten ranger districts. For planning and scheduling purposes, the allowable sale quantity is distributed by ranger district. Each district has been allocated a portion of the timber harvest program based on the FORPLAN computer run and availability of suitable and available acres, to implement the Forest Plan, and Section 101 of the Tongass Timber Reform Act (1990). The average distribution of the Forest Plan ASQ harvest among the ranger districts is displayed in Table A-4 (all volumes are identified as sawlog plus utility).

Table A-4
Distribution of Forest Plan ASQ for the Tongass National Forest Ranger Districts

Ranger District	**Non-Interchangeable Components**	
	NIC I	**NIC II**
Ketchikan/Misty Fiords	32	7
Thorne Bay	42	9
Craig	33	7
Wrangell	28	6
Petersburg	50	9
Sitka	17	4
Hoonah	7	2
Juneau	7	2
Yakutat	4	1
Admiralty National Monument	0	0
NIC Totals	**220**	**47**
ASQ Total (mmbf)	267	

The Forest Supervisor for the Tongass National Forest has discrete responsibilities for the overall management of the Forest's timber sale program. Included within these responsibilities is making the determination on the

amount of timber volume to be made available to industry, as described above. Once a determination is made for the current year (annual demand) offer level, the information is presented to Congress via the Regional Forester and Chief of the Forest Service. Whether or not funding is appropriated to attain the program is the responsibility of the Congress and the President of the United States.

While the debate on funding takes place, the Tongass Forest Supervisor directs the District Rangers to formulate a timber sale plan that attains the prescribed offer level for the current year as well as developing outyear timber programs based on projected market demand for the planning cycle. District Rangers are also directed to prioritize efforts in areas that are economical as possible and are not subject to pending legislation and litigation. The Ranger's role is to recommend to the Forest Supervisor timber harvest projects that meet Forest Plan goals and objectives. Districts work on various projects simultaneously, resulting in continual movement of projects through the stages of the timber program pipeline. Their schedule allows the necessary time to complete preliminary analysis, resource inventories, environmental documentation, field layout preparations and permit acquisition, appraisal of timber resource values, advertisement of sale characteristics for potential bidders, bid opening, and physical award of the timber sale. Once all of the Rangers' recommendations are made and compiled into a consolidated schedule, the Forest Supervisor is responsible for the review and approval of the final schedule.

The implementation of the sales on the schedule depends on Congressional appropriations. In the event insufficient funds or resolution to pending litigation or legislation delay planned sales, timber sale projects are selected and implemented on a priority basis. Generally, the higher priority projects include sales where investments such as road networks, camps or log transfer facilities have already been established or where land management status is not under dispute. The location and distribution of sales across the Tongass is also taken into account to distribute the impacts to the environment and users of the area and to provide sales in proximity to all processing facilities. Those sales that are not implemented or only partially implemented are moved to an outyear. The sale schedule becomes very dynamic in nature due to the number of influences on each district. A formal review of the schedule is done annually by the Forest Supervisor in consultation with the District Rangers, and amendments are made as needed through the course of the year. (The Tongass Timber Sale Plan is located on the Tongass National Forest Website, *www.fs.fed.us/r10/tongass/*).

The National Forest Management Act requires the Forest Service to develop timber sale schedules that encompass the life of the Forest Plan. The Tongass National Forest Planning process culminated in issuance of the *Record of Decision* for the *Tongass Land and Resource Management Plan*. The timber sale schedule is included in Appendix L of the Forest Plan. In response to this Plan, the Tongass has prepared a Ten Year Timber Sale Schedule for Fiscal Years 2004-2013. The Ten Year Timber Sale Schedule for Fiscal Year 2004-

2013 offer levels are based to the extent possible on the annual market demand estimates. This demand is calculated annually and the ten year plan is then updated. Demand may fluctuate from year to year but recent years have shown little change in the demand. Offerings may vary from year to year but averages out to the low market scenario range as determined by the calculated annual demand. Planning delays attributable to the resolution of the Roadless Rule and court ordered injunctions has affected this offer level in recent years. Table A-5 displays the timber sales planned for Fiscal Year 2004 and are an example of the information available on the schedule. These sales may change because of appeals and litigation, economics or policy changes.

The Ten Year Timber Sale Schedule provides the following information among other items:

NEPA Project: Environmental document project name. This name may or may not differ from the timber sale project name depending on how many sales originate from the original NEPA document.

Decision Date: The date of the decision document, whether planned or actual. "(Date)*" denotes the project has started and completion is planned within the Fiscal Year but there is no decision at this time.

RD: Ranger district where project is located

NEPA decision volume (MMBF): The amount of volume in million board foot approved by the NEPA decision document. Timber sale project volume (sawlog plus utility).

Sale Name: Timber sale project name. Volume from a NEPA document may be divided into several sales or volumes can be combined from several NEPA documents.

Gate 3 (Layout): The fiscal year sale is to be laid out. If blank, the sale has previously been delineated on the ground and cruised. Number indicates potential or actual volume depending if cruise and appraisal is complete.

Gate 5 (Offer): The fiscal year sale is to be offered for sale. Number indicates potential or actual volume depending if cruise and appraisal is complete.

Table A-5
Tongass Ten Year Timber Sale Schedule -Fiscal Year 2004

Project Name	NEPA Decision Date Gate 2	Ranger District (RD)	NEPA Decision (MMbf)	Sale Name	Gate 3	Gate 5
Licking Ck EIS, Sea Level EIS, Mop Point EA, Brand X EA	Various	Ketchikan RD	73.0	Painted Peak	40.0	40.0
Sea Level EIS	X	Ketchikan RD	51.0	Orion North	8.0	8.0
Boundary EA	Jan-04	Ketchikan RD	3.0	Boundary	3.0	3.0
Cholmondeley EIS	Apr-03	Craig RD	35.0	Sunny	7.0	7.0
Cholmondeley EIS	Apr-03	Craig RD	35.0	Cher	5.0	5.0
Thorne Bay Small Sale EAs	Various	Thorne Bay RD	11.2	Various	2.7	3.0
Roadside EA	X	Thorne Bay RD	15.0	Small Sales	1.9	2.0
Lab Bay EIS	X	Thorne Bay RD	42.2	Thorne Island	0.0	1.8
Luck Lake EIS	X	Thorne Bay RD	22.0	Luck Lake ReOffer	0.0	13.9
Luck Lake EIS	X	Thorne Bay RD	22.0	Lucky Logger	0.0	0.5
Control Lake EIS	X	Thorne Bay RD	57.9	Kogish/Shiniku	2.0	10.0
Heceta Second Growth EA	(Apr-04)*	Thorne Bay RD	5.5	Heceta CT Sale	0.1	5.5
		Juneau RD	0.0	No Sales Planned		
Finger Mountain EIS	Jun-03	Sitka RD	21.4	Inbetween		10.1
Finger Mountain EIS	Jun-03	Sitka RD	21.4	Fogg Creek	10.3	10.3
8-Fathom	X	Hoonah RD	X	Midway/Hotsprings		15.8
Hoonah RD Small Sales EA	(Jul-04)*	Hoonah RD	0.4	Small Sales	0.4	0.4
Salvage CE	(May-	Yakatat RD	0.2	Small Sales	0.1	0.1
South Lindenberg EIS	X	Petersburg RD	40.0	South Lindy Mt. Re-sale Two	13.5	13.5
Woodpecker EIS	March-02	Petersburg RD	4.5	Cove	0.5	0.5
Three Mile EIS	(April-04)*	Petersburg RD	20.0	Threemile	20.0	20.0
Overlook EA NEPA	(Jun-04)*	Petersburg RD	7.0	Overlook	2.0	2.0
Doughnut EA	X	Wrangell RD	8.0	Doughnut		3.4

How Does the Forest Service Decide Where Timber Harvest Projects Should be Located?

The location of timber sale projects is based on the land allocation directed in the Forest Plan decision. The Forest Plan allows timber sales in areas identified as Timber Production, Modified Landscape, and Scenic Viewshed Land Use Designations.

The District Ranger is responsible for identifying and recommending the project areas for the Ten Year Timber Sale Schedule. The considerations the Ranger makes on each project include but are not limited to the following:

- The project area contains a sufficient number of acres allocated to development Land Use Designations to make timber harvest in the area appropriate under the Forest Plan. There is an adequate amount of suitable and available land for timber harvest opportunities. Available information indicates harvest of the amount of timber volume being considered for this project can occur consistent with the Forest Plan standards and guidelines, other resource protection requirements and human needs such as subsistence.
- The project and proposed timber harvest volume contribute to achieving the goals and objectives of implementing the Forest Plan.
- The potential investment in infrastructure (roads, bridges, log transfer facilities, camps, rock pits, etc.) necessary for sustainable timber harvest offerings is achievable with the project and estimated value of timber. Where infrastructure already exists, this project will enable any maintenance and upgrade of the facilities necessary for removal of timber volume.
- Based on current year and anticipated outyear timber volume demand, volume currently under contract; anticipated Congressional allocations, and the availability of resources to fully prepare and offer this project for sale, this project is consistent with and meets all laws and regulations governing the removal of timber from National Forest System lands, Forest Service policies as described in the manuals and handbooks, and the 1997 Tongass Land and Resource Management Plan FEIS and ROD.

How Does This Project Fit into the Tongass Timber Program?

The Emerald Bay Timber Sale project is currently in Gate 2, "Volume Under Analysis." The amount of volume for the action alternatives is approximately 12.1 MMBF to 16.3 MMBF that could contribute to the Tongass Timber Sale Program. A no-action alternative is also included. If an action alternative is

selected in the decision for the Emerald Bay Timber Sale, this volume will be added to the volume available for sale. As described in above, the volume of timber needed to maintain Pool 1 is 4.5 times the expected harvest for that year. Currently, forest-wide, Pool 1 contains from 450 MMBF to 520 MMBF inclusive of this project. Therefore, the Emerald Bay Timber Sale project is consistent with program planning objectives and necessary to meet the goal of providing an orderly flow of timber from the Tongass on a sustained yield basis. Given the included information, it is reasonable to be conducting the environmental analysis for this project at this time. The Emerald Bay Timber Sale project is tentatively proposed for decision in 2004 and offer beginning in Fiscal Year 2005 (Tongass National Forest Ten Year Timber Sale Plan, Forrest Cole, Forest Supervisor, Tongass National Forest, January 12, 2004).

Why Can't This Project Occur Somewhere Else?

The suitable and available land base on the Tongass National Forest is capable of supporting an Allowable Sale Quantity of 267 MMBF annually, 220 MMBF of which is considered economical (i.e. the NIC I component) under the usual markets. Based on the projected market demand for the planning cycle, all suitable timberlands will eventually be scheduled for harvest to meet the current and projected demand for raw material in Southeast Alaska. The relocation of this project to another area is inefficient and potentially contrary to the standards and guidelines of the Forest Plan. This decision is based on the cumulative impact on other resources from past harvest activities, the location of timber sales under contract, and the eventual use of all suitable lands for timber sale projects.

The reasons this area is being considered include:

- Areas with available timber will be necessary to consider for harvest in order to seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle, pursuant to Section 101 of the Tongass Timber Reform Act (TTRA).
- The potential effects on subsistence resources are projected to differ little based on the sequence these areas are harvested. Harvesting other areas with available timber on the Tongass National Forest is expected to have similar potential effects on resources, including those used for subsistence, because of widespread distribution of subsistence use and other factors. Harvest within other areas is foreseeable under the Forest Plan.
- Providing substantially less timber volume than required to meet Forest Plan and TTRA Section 101 timber supply and employment objectives in order to avoid harvest in the project area is not necessary or reasonable.
- It is reasonable to schedule harvest in the project area rather than in other areas at the present time. Harvest at this time would improve timber

growth and productivity, and harvest dead and dying Alaska yellow cedar. This project would not pose a possibility of a restriction on any subsistence resource. Other areas that are reasonable to consider for harvest in the near future are the subjects of other project EISs that are currently ongoing or scheduled to begin soon.

Appendix B

Biological Assessment and Biological Evaluation

Appendix B

Emerald Bay Timber Sale

Biological Assessment and Biological Evaluation

Threatened, Endangered and Sensitive Species

Prepared By: Mike Brown
Wildlife Biologist, Tongass National Forest

Phyllis Woolwine
Botanist, Tongass National Forest

Updated By: Betsy Hamann

TEAMS Wildlife Biologist, October 2003

Introduction

This combined Biological Assessment (BA) and Biological Evaluation (BE) was prepared for the Emerald Bay Timber Sale as required by Section 7 of the Endangered Species Act (ESA), as amended, and the USDA Forest Service Threatened, Endangered and Sensitive Plant and Animal Species Policy (FSM 2670). This document describes the occurrence of and project effects on species that are Federally listed or proposed for Threatened or Endangered status. This document also serves as a BE by including equivalent information on Forest Service sensitive species. The BE is not required under the ESA, but is required by the Forest Service for all internal programs and activities (FSM 2672.4).

A Draft Supplemental Environmental Impact Statement (EIS) has been prepared for the Emerald Bay Project Area. The action includes the harvest of between 601 (Alternative B) and 620 (Alternatives C and D) acres of old-growth forest. Alternative B uses a mix of even and uneven-aged silvicultural prescriptions, while Alternatives C and D use uneven-aged silvicultural systems. Alternative C would not construct any new road while Alternatives B and D would construct 6.2 miles and 3.8 miles of new roads respectively. Alternatives B and D would require a barge LTF at Emerald Bay. The Emerald Bay Project Area includes 7,845 acres of which 67% has been designated as old-growth habitat reserve. The Emerald Bay Project Area is located approximately 40 miles north of Ketchikan, Alaska and encompasses an area of the northern Cleveland Peninsula that faces Ernest Sound.

Table 1. **Comparison of Alternatives**

Category	Alternative A	Alternative B	Alternative C	Alternative D
Even-aged prescriptions	0	396 acres	0	0
Uneven-aged prescriptions	0	205 acres	620 acres	620 acres
Miles of new road construction	0	6.2 miles	0	3.8 miles
LTF Construction	0	1 LTF	0	1 LTF

Lists of Species Covered in this Document

Threatened and Endangered Species potentially occurring in the Project Area were identified through consultation with the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). Consultation correspondences will be located in the Emerald Bay Project Planning Record. Table 2 lists the Threatened and the Endangered Species that may occur in or near the Project Area and summarizes the findings of this document.

Table 2. **Threatened and Endangered Species that May Occur in Alaska and Off-shore Waters as Listed by the FWS and NMFS**

Common Name	Scientific Name	ESA Status	Occurrence on the Tongass or in adjacent marine waters
Aleutian shield fern	*Ploystichium aleuticum*	Endangered	Does not occur
Humpback whale	*Megaptera novaeangliae*	Endangered	Common
Blue whale	*Balaenoptera musculus*	Endangered	Uncommon
Bowhead whale	*Balaena mysticetus*	Endangered	Uncommon
Fin whale	*Balaenoptera physalus*	Endangered	Uncommon
Right whale	*Balaena glacialis*	Endangered	Uncommon
Sei whale	*Balaenoptera borealis*	Endangered	Uncommon

Sperm whale	*Physeter macrocephalus*	Endangered	Uncommon
Snake River sockeye salmon	*Onchorhynchus nerka*	Endangered	Does not occur
Upper Columbia River spring chinook salmon	*Onchorhynchus tshawytscha*	Endangered	Does not occur
Upper Columbia River steelhead	*Oncorrhynchus mykiss*	Endangered	Does not occur
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	Uncommon
Eskimo curlew	*Numenius borealis*	Endangered	Does not occur
Short-tailed albatross	*Phoebastria albatrus*	Endangered	Does not occur
Steller sea lion	*Eumetopias jubatus*	Threatened	Common
Snake River spring/summer chinook salmon	*Onchorhynchus tshawytscha*	Threatened	Does not occur
Snake River fall chinook salmon	*Onchorhynchus tshawytscha*	Threatened	Does not occur
Puget Sound chinook salmon	*Onchorhynchus tshawytscha*	Threatened	Does not occur
Lower Columbia River chinook salmon	*Onchorhynchus tshawytscha*	Threatened	Does not occur
Upper Willamette River chinook salmon	*Onchorhynchus tshawytscha*	Threatened	Does not occur
Snake River Basin steelhead	*Oncorrhynchus mykiss*	Threatened	Does not occur
Lower Columbia River steelhead	*Oncorrhynchus mykiss*	Threatened	Does not occur
Upper Willamette River steelhead	*Oncorrhynchus mykiss*	Threatened	Does not occur
Middle Columbia River steelhead	*Oncorrhynchus mykiss*	Threatened	Does not occur
Lake Ozette sockeye salmon	*Oncorrhynchus nerka*	Threatened	Does not occur
Spectacled eider	*Somateria fischeri*	Threatened	Does not occur
Steller's eider	*Polysticta stelleri*	Threatened	Does not occur

Only the humpback whale, Steller's sea lion and leatherback sea turtle will be analyzed for this project. The rationale for not analyzing the other species is listed below.

Plant species

The Aleutian shield fern occurs only in the Aleutians (Adak Island). This species does not occur on the Tongass.

Bird species

The Eskimo curlew is a northern Alaska species it thought to be extinct. Habitat for this species does not occur in Southeast Alaska. There are only two beeding colonies of short-tailed albatross that remain active, and they are both in Japan. They forage widely and have been observed in the Gulf of Alaska along the Aleutian Islands and in the Bering Sea. This species has not been observed in the marine waters of the Inside Passage (FWS Fact Sheet). The spectacled eider occupies coastal waters around Norton Sound, Ledyard Bay and between St. Lawrence and St. Matthew Islands in western and northern Alaska. The Steller's eider occupies coastal waters around the Alaska Peninsula, Kodiak Island, lower Cook Inlet, and Nunivak Island. Primary breeding grounds occur in Russia, western Alaska, or the arctic coastal plain of Alaska. Habitat for these species does not occur on the Tongass National Forest.

In May 2001, the Kittlitz's murrelet was petitioned for listing. This species is found in more glacially-affected habitats, such as Glacier Bay and Tracy Arm. There is no suitable habitat on Cleveland Peninsula or on the Ketchikan/Misty Fiords Ranger District and is not analyzed here.

Salmon species

Snake River sockeye salmon occur in adjacent waters near the western boundaries of the Tongass National Forest but do not occur within the marine waters of the Inside Passage. The Upper Columbia River spring chinook salmon, Puget Sound Chinook salmon, Upper Willamette River chinook salmon, Snake River spring/summer/fall chinook salmon occur in marine waters on the outside coast to the west of the Tongass National Forest but they are not known to inhabit marine waters of the Tongass National Forest.

No threatened or endangered fish species are found in the freshwater river systems in the project area. Two threatened species, the Snake River spring/summer chinook salmon, and one endangered species, the Snake River sockeye salmon

(Oncorhychus nerka), have been caught in the troll fisheries off Kruzof Island on the outside coast. However, the presence of these Pacific Northwest salmon is not documented in the waters near the project area.

Whale species (except Humpback)

Blue whale, bowhead whale, fin whale, right whale, sei whale and sperm whale are generally found in pelagic marine waters. They may be found in outside coastal waters but rarely enter the marine waters of the Inside Passage.

Sensitive species

The Forest Service has identified Sensitive Plant and Animal Species that could potentially occur in or near the Tongass National Forest Table 3 lists these Sensitive Species and identifies those which may occur in the Project Area . This list was drawn from the January 2000 list for animals, and the June 2002 list for plants.

Table 3. **Alaska Region Sensitive Species that May Occur in the Emerald Bay Project Area**

Common Name	Scientific Name	Emerald Bay project area
Trumpeter swan	*Cygnus buccinator*	limited fall, winter and spring use in estuary
Queen Charlotte goshawk	*Accipiter gentilis laingi*	may occur
Osprey	*Pandion haliaetus*	may occur
Peale's peregrine falcon	*Falco peregrinus pealei*	not likely to occur
Goose-grass sedge	*Carex lenticularis* var. *dolia*	may occur in subalpine habitats
Edible thistle	*Cirsium edule*	Not likely to occur
Davy mannagrass	*Glyceria leptoctachya*	may occur
Wright filmy fern	*Hymenophyllum wrightii*	may occur
Truncate quillwort	*Isoetes truncata*	not likely to occur
Calder lovage	*Ligusticum calderi*	may occur
Bog orchid	*Platanthera gracilis*	may occur
Loose-flowered bluegrass	*Poa laxiflora*	may occur
Unalaska mist-maid	*Romanzoffia unalaschecensis*	May occur
Queen Charlotte butterweed	*Senecio moresbiensis*	may occur
Moonwort fern	*Botrychium tunux*	Not likely to occur
Moonwort fern	*Botrychium yaaxudakeit*	Not likely to occur
Northern pike	*Esox lucius*	Does not occur
Fish Creek chum salmon	*Oncorhynchus keta*	Does not occur
King Salmon River and Wheeler Creek king salmon	*Oncorhynchus tshawytscha*	Does not occur

Fish species

None of the sensitive fish species occurs in or near the project area. The Island King Salmon only occurs on Admiralty Island. The Fish Creek chum salmon only occupies Fish Creek near the town of Hyder, Alaska. The northern pike only occurs on the Yakutat Forelands. These species will not be analyzed further.

Field Surveys

Botanical Surveys

Field assessment for the Project Area began in 1998; since then, all harvest units have been visited by one or more field crews including stand exam, wildlife, archeology, fisheries, soil survey and unit reconnaissance crews. Many of these field personnel had knowledge of plants. Field crews were equipped with sensitive plant identification cards and asked

to report any sensitive plants seen during the course of their duties. This method is generally ineffective at locating rare plants.

During 1998, two botanical surveys were completed by a professional botanist in proposed units 3, 9, and 12. One target plant species, choris bog orchid (*Platanthera chorisiana*), was found, and it occurred during both surveys. This species was a sensitive species at that time, but was removed from the list in 1999. It will be not be analyzed further here, but is analyzed in the EIS as a Species of Interest. These surveys followed the "Inventory Protocol for Sensitive and Rare Plants for the Ketchikan Area" (Krosse 1997). The protocol calls for use of the Intuitive Controlled survey method, the standard method for botanical surveys on National Forest Lands. The detailed methods and results of botanical surveys, along with survey routes, can be found in the Planning Record (P.A. Woolwine, report of October 24, 1997).

During pre-field review, units were selected for surveying according to two criteria: (1) units were prioritized based on their greater probability for harvest, and (2) aerial photos were then examined for high-likelihood Sensitive Plant habitats in and adjacent to the units.

Additional surveys of the proposed road locations were done in September 2003 (Krieckhaus 2003). No sensitive plant species were found.

Goshawk Surveys

The objective of goshawk surveys in the Project Area was to locate goshawk nest sites. Knowledge of nest site locations allows for goshawks to be more accurately considered during Project alternative development and analysis. Standards and Guidelines will be applied to any discovered nests.

Goshawk surveys followed the protocol established for the Alaska Region Goshawk Inventory Protocol, first issued June 24, 1992. Areas with reported goshawk sightings were the first priority for surveys. Sightings ranged in confidence level from low to high. Some reports were for raptors in general. Wildlife crews usually investigated these sightings, if possible, because we felt even a slight possibility of observing a goshawk increased the chances of finding a nest. A tentative northern goshawk nest found in 2000 was confirmed to be a red-tailed hawk nest.

Surveys also included time spent observing from vantage points (Crocker-Bedford 1997). If the protocol station fell at a good vantage point, field crews would often spend 30 minutes or an hour sitting and looking for goshawks. We felt this increased our chances of observing a goshawk. If a goshawk was observed, we could then concentrate our surveys in that direction. While this method is the best available at this time, it does not guarantee that all nests will be found. In fact, we suspect many nests are not found, even if the surveys are conducted close to the nest.

Field crews completed surveys during 7 days in 1992 and 1998 that included 62 broadcast stations. Additional surveys were done on 3 days in 2000. Field crews observed no goshawks and found no goshawk nests. District records and databases indicate no incidental goshawk sightings within the Project Area.

Bald eagle Surveys

Surveys in June 2000 found three nests located at or near Emerald Bay, and no nests were found immediately north of Emerald Bay (FWS 2000). In June of 2001, aerial surveys of the three bald eagle nests were conducted. During these surveys, 2 of the 3 nests were found (the southernmost one, and one of the two that are close together). They appeared dilapidated and did not appear to have been active for several years (Spiering and Zelenak, 2001).

Biological Assessment for Threatened and Endangered Species

Humpback Whale

Humpback whales are the most abundant of the eight species of endangered whales that occur in Southeast Alaska waters. Their population in the North Pacific is estimated at about 1,200, which is about 8 percent of the prewhaling population. These whales are regularly sighted in the Inside Passage and coastal waters of the Southeast Alaska panhandle from Yakutat Bay south to Queen Charlotte Sound. Humpback whales feed in Southeast Alaskan waters from about May through December, although some have been seen every month of the year. Peak numbers of whales are usually found in nearshore waters during late August and September, but substantial numbers usually remain until early winter. Baker et al. (1985) estimate that 300 to 350 humpback whales inhabit Southeast Alaska during the summer and fall.

The local distribution of humpbacks in Southeast Alaska appears to be correlated with the density and seasonal availability of prey, particularly herring (*Clupea harengus*) and euphausiids. Important feeding areas include Glacier Bay and adjacent portions of Icy Straight, Stephens Passage/Frederick Sound, Seymour Canal and Sitka Sound. Glacier Bay and Icy Straight appear to be important feeding areas early in the season, when whales prey heavily on herring and other small schooling fishes. Frederick Sound is important later in the summer, when whales feed on concentrations of euphausiids. During autumn and early winter, humpbacks move out of the Sound to areas where herring are abundant, particularly Seymour Canal. Other areas of Southeast Alaska may also be important for humpbacks and need to be evaluated. These include: Cape Fairweather, Lynn Canal, Sumner Strait, Dixon Entrance, the west coast of Prince of Wales Island, and offshore banks such as the Fairweather Grounds.

Because the humpback inhabits shallow coastal areas, it is increasingly exposed to human activity. Consequently, these whales may be more susceptible to confrontational disturbance, displacement, and loss of habitat from environmental degradation than some other whale species. Humpbacks summering in Southeast Alaska have been linked to three wintering areas in Mexico, Hawaii, and Japan.

The recovery plans for the humpback whale identified six categories of human impacts to these species: hunting, entrapment and entanglement in fishing gear, collisions with ships, acoustic disturbance, habitat degradation, and competition for resources with humans.

National Forest management activities which may have an affect on whale habitats or populations, generally fall into the categories of acoustic disturbance and habitat degradation. These management activities include the development and use of LTFs and their associated camps, the movement of log rafts from LTFs to mills, and the potential development of other docks and associated facilities for mining, recreation, and other Forest uses and activities. Generally, with the development and use of LTFs and other docking facilities for projects, there is an associated increase in recreational boating in the immediate vicinity during the construction and use of the facilities.

Most of the information and data for whales in Southeast Alaska are associated with one species, the humpback whale, because it is the most abundant whale to occur in Southeast Alaska waters. The other seven species of whales are either present only seasonally as they migrate along the outer coastal areas, or are only occasionally found in the inside coastal waters of Southeast Alaska. The following discussion and analysis is primarily based on humpback whales, but is assumed to be applicable to the other species of whales.

Construction and operation of LTFs and other docking facilities are restricted to small, very localized areas of the marine environment. There is little potential to directly affect whales with these facilities. Two potential indirect effects of LTFs, other docking facilities and associated activities have been identified: (1) effects on whale prey species, and (2) disturbances of whales by boat traffic associated with LTFs. Two alternatives for this Project propose the construction of one LTF. This would be a barge LTF, located south of Emerald Bay, and would only be used at high tide.

Effects on Prey

Nemoto (1970) noted that euphausiids and gregarious fish are the primary prey of humpbacks. Thirteen species of fish and 57 species of invertebrates were identified as humpback whale prey in Southeast Alaska. Humpbacks studied in Glacier Bay and Stephens Passage-Frederick Sound were found most frequently in areas of high prey density (Wing and Krieger 1983).

Construction and operation of all LTFs and similar facilities require U.S. Army Corps of Engineer, U.S. Environmental Protection Agency, and State of Alaska tidelands permits. The permitting process provides that construction and operation maintain water quality in the specific facility locations, and that marine circulation and flushing are maintained. All facilities must be in conformance with permit standards. Although the effects may vary locally, the major effect of leachates (ie. terpene, alpha-conindentric acid, alpha-conindentrin, hydroxymatairesinol, linoletic acid, and dehydroabientic acid) from bark sloughing off log rafts is upon invertebrates. Crustaceans, shrimp, and crab larvae seem especially sensitive (Pease 1973, Buchanan and Tate 1976). Since a barge LTF is proposed, it should have less effect on the marine environment than other LTF's. Logs would not be rafted directly in the water, and there would be less bark sloughing into the water.

Effects from Disturbance

Humpback whale response to nearby boating activity varies from no apparent response to pod dispersal, sounding, breaching, evasive underwater maneuvers, and maintaining distance (Baker and Herman 1983, Baker et. al. 1982). Disturbance by boat activity has been suggested as one of the possible causes of observed changes in whale distribution in Southeast Alaska. Direct pursuit of whales by boats and frequent changes in boat speed and direction appear to elicit avoidance behaviors more frequently than other types of boat traffic. However, whales may readily habituate to constant and familiar noise (Norris and Reeves 1978). Whales can be commonly found in some areas of Southeast Alaska which have considerable boat traffic. Whether they are habituated to boat traffic has not yet been documented. Adverse effects from current levels of boat traffic have not yet been documented.

Two basic types of boat activity associated with LTFs are towing and recreational boating by workers. Towing frequency would vary between camps, seasons, and years, with an average of about once a week during the working season (USDA Forest Service 1989). Barges maintain relatively constant speeds and directions during towing; constant speed and direction elicit less avoidance behavior from whales than other types of boating activity. Towing routes are generally well established, and adverse effects from log-raft towing have not been documented.

Recreational boating activity related to this Project would likely be relatively low and would last only for a short period of time (2-3 seasons). This activity would be concentrated near the LTF. It is estimated that most recreational boating would occur within a few miles of the site, a few trips would be made over 10 miles, and activity greater than 30 miles from a site would be negligible. This boating would involve frequent changes in speed and direction and may include some small amount of whale pursuit, if the whales are within sight of the camp or an occupied boat. The effect of such recreational activity on whales would depend on many factors such as size of the bay, depth of the waters in the bay, number of boats, individual behavior responses of the whales, etc. Currently, there is not a quantifiable way to estimate these possible effects.

Cumulative Effects

There are no State, tribal, local or private actions of a similar nature planned to occur within VCU 7210 or WAA 1817. Cumulative effects, as defined by ESA Section 7 are not anticipated.

Summary

The following Forest-wide Standards and Guidelines have been developed for the TLMP (1997) and are incorporated into the Emerald Bay EIS by reference.

1. Provide for the protection and maintenance of whale habitats.

2. Ensure that Forest Service permitted or approved activities are conducted in a manner consistent with the Marine Mammal Protection Act, the Endangered Species Act, and NMFS regulations for approaching whales, dolphins, and porpoise. "Taking" of whales is prohibited; "taking" includes harassing, pursuing, or attempting any such activity.

No adverse effects on whales from implementation of Forest management activities are anticipated. Indirect effects may be associated with possible increased boating activity, but compliance with Forest Service Standards and Guidelines

should partially mitigate any adverse effects on whales resulting from the proposed timber sale alternatives. Generally, the Forest Service has no control over the routes taken by tugboats with log rafts or recreational boating activities.

Steller Sea Lion

The Steller sea lion (northern) ranges from Hokkaido, Japan, through the Kuril Islands and Okhotsk Sea, Aleutian Islands and central Bering Sea, Gulf of Alaska, Southeast Alaska, and south to central California. There is not sufficient information to consider animals in different geographic regions as separate populations. The centers of abundance and distribution are the Gulf of Alaska and Aleutian Islands, respectively. Important food resources include walleye pollock, salmon, eulachon, and cephalopod mollusks. Steller sea lions forage predominantly in nearshore areas and over the continental shelf.

In 1990, because of an large population decline observed over the last 31 years (primarily in the former Soviet Union, Gulf of Alaska, and Aleutian Islands), the NMFS listed the Steller sea lion as a threatened species throughout its range. The number of sea lions observed on certain rookeries from Kenai Peninsula to Kiska Island declined by 63 percent since 1985 and by 82 percent since 1960. Significant declines have also occurred on the Kuril Islands. The cause of overall population decline has not been confirmed. However, incidental mortality of sea lions in commercial fishing gear, shooting by fishermen, and reduced prey species due to commercial fishing operations, have probably contributed significantly to declines (Reeves et al. 1992). When the sea lion was given emergency listing as a threatened species in the Federal Register (April 5, 1990), buffer zones restricting human activities were established around rookeries west of 150 degrees west longitude (does not include Southeast Alaska). A recovery team has prepared a recovery plan (National Marine Fisheries Service 1992). The NMFS provides a summary of factors affecting the Steller sea lion (Federal Register April 5, 1991). These factors include: reductions in the availability of food resources, especially pollock, which is the most important prey species for sea lions; commercial harvests of sea lion pups; harvests for subsistence, public display and scientific research purposes; predation by sharks, killer whales, and brown bear; disease; the inadequacy of existing regulations regarding quotas on the incidental harvesting of sea lions during commercial fishing operations; and other natural or human incidences such as shooting adult sea lions at rookeries, haulout sites, and in the water near boats. None of these factors are regulated by or within the jurisdiction of the Forest Service.

Information on population trends in Southeast Alaska is sketchy, but limited data suggest that Southeast populations are stable or perhaps slightly increasing. Adult Stellar sea lion populations in Southeast Alaska increased about 30% between 1979 and 2000, based on uncorrected counts at rookeries. The closest Steller sea lion rookery to the Project Area is on Forrester Island, west of Prince of Wales Island. A sea lion haulout used for sunning and resting occurs on Easterly Island, about 1.5 miles west of Emerald Bay. It has been designated as critical habitat for Steller sea lions. Harassment or displacement of sea lions from preferred habitats by human activities such as boating, recreation, aircraft, LTFs, etc., is a concern with regard to long-term conservation of the sea lion in Southeast Alaska.

Summary

Forest-wide Standards and Guidelines direct the Forest Service to prevent and/or reduce potential harassment of sea lions and other marine mammals due to activities carried out by or under the jurisdiction of the Forest Service, and these will be incorporated by reference into the Emerald Bay EIS from the TLMP (1997). These Forest-wide Standards and Guidelines are as follows:

1. Protect Steller sea lion habitats.

2. Ensure that Forest Service permitted or approved activities are conducted in a manner consistent with the requirements, consultations, or advice received from the appropriate regulatory agencies for the Marine Mammal Protection Act, the Endangered Species Act, and NMFS Standards and Guidelines for approaching seals and sea lions. "Taking" of marine mammals is prohibited; "taking" includes harassing, pursuing, or attempting any such activity.

3. Locate facilities, camps, LTFs, campgrounds, and other developments at least 1 mile from known haulouts, and farther away if the development is large.

4. Cooperate with State and other Federal agencies to develop sites and opportunities for the safe viewing and observation of marine mammals by the public. Maintain a public education program explaining Forest management activities related to marine mammals in cooperation with State and other Federal agencies.

After consultation with the National Marine Fisheries Service, additional procedures to prevent disturbance of the Easterly Island haulout will be required for the Emerald Bay Project. These additional procedures were added because

during lower tides the haulout has relatively abrupt dropoffs that could be hazardous to sea lions. Project-associated boats will be required to remain at least 200 yards from the haulout. Project-associated aircraft will be required to remain at least 0.5 miles horizontal and 1500 feet vertical distance from the haulout. The Emerald Bay Project should have no adverse effects on Steller sea lions or on their critical habitat.

Fish

The presence of Threatened or Endangered Pacific Northwest salmon is not documented for salt waters near the Project Area, but their occurrence is possible. Pink, chum, and coho salmon (not listed species) occur in Project Area fresh waters, however, Chinook and sockeye salmon do not. The application of Forest Plan Standards and Guidelines will be adequate to protect stream fishery resources in the Project Area. Some increased boating activity may occur between Ketchikan and Emerald Bay, but due to infrequent occurrence, this increased activity will not impact these salmon stock. Based on this information, there will be no effects on any of the 13 listed fish species shown in Table 2.

Leatherback sea turtle

This species used open seas, bays and estuaries. It has the most extensive range of any reptile. Western hemisphere populations are found from Nova Scotia south to Puerto Rico and the US Virgin Islands, Mexico and northern South America. They are also commonly seen in Hawaiin off-shore waters and occassionally sighted as far north as Newfoundland, British Columbia and Alaska. Overall nesting trends in the US are stable; only minor nesting occurs in the US, mainly in Florida. Threats have been identified as beach front development, disturbance, commercial fisheries entanglement, harvest of eggs and adults and marine pollution, especially plastics and oil spills. None of these factors are regulated by, or within the jurisdiction of the Forest Service. Implementation of any of the alternatives would have no effect on this species or designated critical habitat (as designated by NMFS 1979).

Biological Evaluation for Sensitive Species

Trumpeter Swans

The breeding range of the trumpeter swan is concentrated along the Alaska Gulf coast and other wetland areas in central and south central Alaska (Bellrose 1980). There are no known trumpeter swan nesting pairs on the Ketchikan Area of the Tongass National Forest (West 1991 They are sensitive to human disturbance; other threats include pollution, lead poisoning and illegal hunting. Only one of these factors, disturbance is potential an effect of this project.

Trumpeter swans that breed in Alaska winter along the Pacific Coast from the Alaska Peninsula to the mouth of the Columbia River (Bellrose 1980). Each year many swans pass through the Ketchikan Area in the spring and fall during migration to and from their breeding grounds. Swans typically leave for their breeding area by mid-April. Swans arrive in the area in mid-October as they are migrating south. Swans that spend the winter here usually move to large estuaries such as Carroll River once the weather turns cold. There is only one, 25-acre, pond on the Project Area, so there is very little swan habitat. Project activities are expected to occur between April 15 and October 31, so there is not much potential for disturbance to migrating or wintering swans.

The Project incorporates the Forest-wide Standards and Guidelines for significant waterfowl areas, beach fringe and estuary fringe. These Standards and Guidelines will protect swan habitats from disturbance. Based on the above information, this Project may impact individuals, but is not likely to contribute to a trend towards listing for the overall swan population in Southeast Alaska.

Queen Charlotte Goshawk

The American Ornithologists Union (AOU) recognizes two subspecies of the northern goshawk in North America—*Accipiter gentilis atricapillus* and *A.g. laingi*, the Queen Charlotte goshawk (AOU 1957). Taverner (1940) first described the darker plumaged Queen Charlotte goshawk as a distinct race occurring in the coastal temperate rainforests of the Queen Charlotte Islands and Vancouver Island, British Columbia (B.C.). Webster (1988) found that the Queen Charlotte goshawk occurred from Vancouver Island north to the Taku River near Juneau. The northern goshawk and Queen Charlotte goshawk are identified by the US Fish and Wildlife Service (USFWS) as Species of Concern throughout their ranges.

The goshawk is a wide-ranging forest raptor that generally occurs in low densities, from 2.4 pairs (Central Alaska, McGowan 1975) to 11.0 pairs (Arizona, Crocker-Bedford and Chaney 1988) per 100 square kilometers, although population densities in Southeast Alaska may be much lower (Crocker-Bedford 1992). The most recent estimates of the goshawk population in Southeast Alaska range from 100 to 381 pairs (USDA Forest Service 1991a; Crocker-Bedford 1994), to 100 to 800 pairs (Alaska Interagency Goshawk Committee, Report of June 30, 1994).

Generally, goshawks appear to exist in relatively low populations in southeast Alaska, especially the southern portion. Goshawk surveys (see pages 5 and 6 of this BE) provided no proof of nesting in the Emerald Bay Assessment Area. Since 1992, more inventory effort has been spent to find goshawks than any other animal (except fishes) in Southeast Alaska. As of 1998, the cumulative number of known nest areas was 55 throughout all of southeast Alaska, 18 of these exhibited nesting in 1998. Within the Ketchikan Area (southern southeast Alaska) 12 nest areas were located between 1987 and 1999. Of these 12 nest areas, monitoring crews located 4 occupied nests in 1997, 3 in 1998, and 2 in 1999. In addition, 1 or more goshawks—but no occupied nest—were detected in 2 nest areas in 1997, 3 in 1998, and 5 in 1999.

In May 1994 the USFWS received a petition from the Southwest Center for Biological Diversity and numerous co-petitioners to list the Queen Charlotte goshawk as endangered pursuant to the Endangered Species Act. In August 1994, the USFWS found that the information presented by the petitioners together with the information in USFWS files was substantial and indicated that listing may be warranted. Therefore, a status review of the species was initiated. After seeking public comments and reviewing available information on the goshawk, a finding was issued in May 1995 that protection under the Endangered Species Act was not warranted for the Queen Charlotte goshawk. Following litigation begun in November 1995, a court directed the USFWS to reconsider their determination. In August 1997 the USFWS again determined that the Queen Charlotte goshawk did not warrant listing. The petitioners again filed suit against the USFWS for failing to list the Queen Charlotte goshawk, and in July 1999, a court directed the USFWS to reconsider their determination.

The primary concern for goshawk population viability is habitat loss due to timber harvest. Research within the range of the Queen Charlotte goshawk demonstrated a significantly greater frequency of relocations of radio-marked goshawks in medium-volume and high-volume mature old-growth forest, especially within the beach/estuary and riparian buffers than the proportions of such habitat within the individual home ranges of the birds under study (Iverson et al. 1996). By contrast, clearcuts were the most avoided of all habitats (Iverson et al. 1996). These radio-telemetry results excluded relocations in the vicinity of nests. Habitat comparisons demonstrated that the vicinities of nests included significantly more forest, and significantly less nonforest, than randomly chosen plots (Iverson et al. 1996).

Reynolds (1983) reported home ranges of *A. g. atricapillus* to be 2,000 to 3,200 hectares (4,942 to 7,907 acres). In southeast Alaska during the breeding season, the mean use area of radio-marked goshawks was 35,000 (214,000 maximum) acres among 17 adult females and 17,000 (48,000 maximum) acres among 16 adult males (Iverson et al. 1996). During the nonbreeding season, the mean (and maximum) use area was 111,000 (452,000 maximum) acres among 16 adult females and 108,000 (562,000 maximum) acres among 15 adult males (Iverson et al. 1996). Goshawks are supported (fed in substantial amounts) by only a portion of the habitats present, and typically most of a home range (where trees are small or sparse) provides little or no sustenance to individuals (Crocker-Bedford 1998). Home ranges appear to be larger (Kenward 1982) and more widely spaced in landscapes where less area exists in stands useful for foraging (Crocker-Bedford 1998). Breeding-pair density appears to depend upon the amount of habitat where suitable prey are more abundant and accessible (proper forest structure) where the chance of prey capture in the habitat is worth the time and energy expended (Crocker-Bedford 1998).

The value of clearcut stands for goshawk nesting or foraging is less than any other habitat in southeast Alaska, and having large portions of early seral forest in a landscape likely reduces cumulative landscape habitat quality (Iverson et al. 1996). Harvesting of units in the Emerald Bay Project Area would increase the amount of early seral forest in Alternative B, thus reducing the cumulative landscape-habitat quality. Table 1 shows the acres of even and uneven-aged prescriptions used by alternative. The uneven-aged prescriptions would allow removal of 50-60% of the existing basal area. Single-tree selection would target trees between 16-24" and 34-44" diameter. The group selection prescription would result in openings not to exceed 2 acres in size. Iverson et al state that uneven-aged silviculture that emulates natural disturbance patterns will have a high likelihood of sustaining goshawk habitat. All prescriptions include the implementation of marten guidelines; these maintain 10-20 % of canopy, average of 4 large trees/acres; average of 3 snags/acre and and average of 3 pieces of downed logs/acre.

Table 4. **Availability of Suitable Goshawk Habitat**

Potential habitat	Alt. A	Alt. B	Alt. C	Alt. D
Moderate and high volume POG < 800 ' elevation	1,859 acres	1,617 acres	1,601 acres	1,601 acres
Percent of project area	24%	21%	20%	20%

Goshawk sensitivity to timber harvest resulted in management recommendations to protect nest-site integrity (USDA Forest Service 1990, USDA Forest Service 1991a, USDA Forest Service Alaska Region 1992 and 1994). Other management recommendations recognized the importance of foraging areas within the post-fledging area (Kennedy 1989, Crocker-Bedford 1990, USDA Forest Service 1991a, and USDA Forest Service Alaska Region 1992 and 1994). There is now widespread recognition of the importance of most foraging habitat, including areas far from the nesting site (Reynolds 1989, USDA Forest Service 1990, Crocker-Bedford 1990, 1994, 1995 and 1998, Marshall 1992, Reynolds et al. 1991, USDA Forest Service Alaska Region 1994, Iverson et al. 1996).

No known goshawk territories are located within the Project Area (see page 4 of this BE). Any pairs of goshawks not discovered prior to timber harvest may be affected if the harvest units correspond to key stands of habitat. Any goshawk nest found prior to harvest will be protected using the TLMP Standard and Guideline for goshawk nest buffers. Although the buffer is likely adequate if only 3 percent of the old growth of a drainage is harvested in any 1 decade (Iverson et al. 1996), the nest site will likely not be occupied long after timber harvesting if large amounts of harvest occur in the surrounding watersheds (Crocker-Bedford 1990, 1991, 1994 and 1995; Patla 1991, Reynolds et al. 1991, Marshall 1992, Woodbridge and Detrich 1994, Hayward et al. 1995). There are no plans to harvest large amounts of forest in surrounding watersheds.

It is our determination that the Project may impact individual goshawks or habitat if timber harvest activities or roads correspond with goshawk nesting stands or key foraging stands. This determination is based on the following factors:

- Goshawks select for (and apparently depend on) medium-volume and high-volume mature and old-growth-forest habitat.
- Goshawks are sensitive to timber harvest, and the habitat value of clearcut stands is very low (Alt B).
- Harvesting of the units in the Project would increase the amount of early seral forest, thus reducing the cumulative landscape habitat quality.

Mitigation

All units laid out for the Project will follow the TLMP Forest-wide Standards and Guidelines. The Project will also follow the TLMP strategy for maintaining viable wildlife populations. If the TLMP Final EIS (including Appendix N) and ROD are correct in their conclusion that the TLMP land-use allocations Standards and Guidelines are adequate to maintain a viable population of goshawks well-distributed accross the forest, then the Emerald Bay Timber Project will also be consistent with the Forest Service viability regulation and Sensitive Species policy. Even though the cumulative effects of timber harvests in southeast Alaska are likely to cause individual home ranges and home-range spacing to expand—leading to a reduction in breeding density—it is assumed that consistency with the TLMP will achieve the Forest Service viability requirement.

Osprey

There is only one known osprey nest located on the Ketchikan-Misty Fiords Ranger District. Nest trees are usually broken-top spruce, either live or dead, and western hemlock snags. Osprey are usually found near water (larger lakes, rivers, beaver ponds, coastal beaches or large estuaries) since their diet consists mainly of fish.

Osprey have been known to stop at some lakes on the District during migration. The one 25-acre lake on the Project Area may provide an opportunity for migrating osprey to rest and feed. No nests have been recorded in or near the Project Area. No osprey have been seen during the breeding season within the Project Area, despite the fact that osprey tend to be more visible than most species.

The Emerald Bay Project is not expected to affect nesting osprey because no known nest site occurs in the Project Area, and because availability of nesting and foraging areas in Southeast Alaska do not appear to be limiting factors. In addition, minimal or no effect on osprey habitat is expected from Project activities because uncut buffers will be maintained near streams, lakes, and coastal areas. If nests are discovered in the Project Area, Standards and Guidelines outlined in the Forest Plan will be followed. Based on this information, the Project may impact individuals or habitat but is not likely to contribute to a trend towards federal listing.

Peale's Peregrine Falcon

In Southeast Alaska, Peale's subspecies of the peregrine falcon (*Falco peregrinus pealei*) nests on the outer islands and on the west coast of Prince of Wales Island. This species is not listed as endangered or threatened, but is covered by a provision of the "similarity of appearance" which broadens the scope of protection for all peregrine falcons.

The nest distribution of this subspecies is closely associated with large seabird colonies located on the outer coasts or nearby islands (USDA Forest Service 1991b), and seabirds are believed to be the major prey of the falcon. No seabird colonies or potential nesting cliffs exist near the Project Area. Based on this information, the Project will have no impact on Peale's peregrine falcons or their habitat.

Goose-grass Sedge

This sedge is known to occur in the coastal mountains of Alaska and B.C. and in the Rocky Mountains from Jasper, B.C., south to Glacier National Park, Montana. Its range in Alaska is limited to the subalpine of coastal South-central and Southeast Alaska and the Aleutian Islands. Because this plant is expected to exist in subalpine habitats, no impacts are anticipated from this Project.

Davy Mannagrass

This grass species is distributed from Southeast Alaska to central California. Its distribution in Alaska is limited to central and southern Southeast Alaska, where it is known to occur in only two documented locations: near Wrangell and on Prince of Wales Island. However, it is easily overlooked and likely to be more widespread in Southeast Alaska (USDA Forest Service 1994).

No known populations of this species occur in the Project Area. It grows in shallow fresh water and along stream and lake margins. The TLMP Standards and Guidelines (TLMP 1997) protects most of its habitat from disturbance, though smaller streams may not receive buffers in the Project. Therefore timber-harvest activities may impact individuals, but are not likely contribute to a trend towards Federal listing.

Wright Filmy Fern

This fern species occurs in coastal areas of Southeast Alaska and British Columbia. Three sightings have been documented in Alaska and are limited to Biorka and Mitkof Islands (USDA Forest Service 1994). It is unknown if the species occurs in the Project Area. This species appears to prefer humid shaded boulders, cliffs, tree trunks, and damp woods. In Alaska, it has been found in small populations on the base of trees and rock outcrops in damp woods.

No observations of this species have been documented for the Project Area. Undetected individuals could be affected. Implementation of the project may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing.

Calder's Lovage

This plant species occurs in British Columbia, Southeast Alaska, and South-central Alaska. Documented occurrences in Alaska are limited to two disparate areas on Kodiak Island and Dall Island (just west of Prince of Wales Island) in Pleistocene refugia on limestone substrate (USDA Forest Service 1994). It is unknown if this species occurs in the Project Area. Calder's lovage occurs on open boggy or rocky slopes, and edges of coniferous forests. In Alaska it is known from subalpine meadow habitats and edges of mixed-conifer forest.

No observations of this species have been documented in the Project Area, though undetected plants could potentially be affected by harvest activities at forest edges. Since most individuals are expected to occur in or near wetland habitats, timber-harvest activities or road construction may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing.

Bog Orchid

This species of bog orchid is limited to a small geographic range in southern most Southeast Alaska and adjacent B.C. (USDA Forest Service 1994). Two documented sightings have been made in Alaska near Pearse Canal and on Dall Island. It is unknown if this species occurs in the Project Area. This plant occurs in wet open-meadow habitat. No observation of this species was made during field reconnaissance. This species is not known to occur in forested areas, but the road location in Alternatives B and D goes thru muskeg or non-forested wetlands that may provide habitat. Implementation of these alternatives may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing.

Loose-flowered Bluegrass

The distribution of this grass species is scattered between Southeast Alaska and Oregon. Seven occurrences have been documented in Southeast Alaska near Hoonah, Sandborn Canal at Port Houghton, and Admiralty Island (USDA Forest Service 1994). It is not known if this species occurs in the Project Area. Loose-flowered bluegrass is associated with moist, open lowland woods and open-forest meadows. Undetected specimens could potentially be affected by harvest activities in these habitats. Therefore, this Project may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing.

Unalaska mist-maid

This species is found on rock outcrops, streambanks and forest edges. The project area is within the range of this species and the project area could contain habitatt, but t has not been found during surveys. Plants that could be found on rock outcrops or streambanks would not be affected due to their location and riparian buffers. Plants located at forest edges could be affected by the road but this was surveyed and no plants of this species were found. The determination for this species is may impact individuals or habitat, but will not likely contribute to a trend toward Federal listing.

Queen Charlotte Butterweed

This species of butterweed is limited to the Queen Charlotte Islands of B.C. and to disjunct populations in Southeast Alaska and northwestern Vancouver Island (USDA Forest Service 1994). Five occurrences have been documented in Alaska on Prince of Wales, Coronation, and Dall Islands. Queen Charlotte butterweed occurs in: shady wet areas and bogs of montane to alpine habitats; open rocky or boggy slopes; and open rocky heath or grass communities (USDA Forest Service 1994).

It is not known if this species occurs in the Project Area. No observations of this species were made during field reconnaissance and no sightings have been documented for the Project Area. Even if this species does occur in the Project Area, direct effects due to harvest activities are not anticipated to be significant because moist, open habitats are generally avoided for timber harvest. However, there could be isolated pockets within units or along the road location that could be suitable habitat. The determination for this species is may impact individuals or habitat, but will not likely contribute to a trend toward Federal listing.

Moonwort ferns

There were two species of moonwort ferns added to the sensitive species list. Botrychium tunux may be found along the Alaska coastline for 250 km in either direction from Yakutat (USFS 2002). The project area is over 600 km south and is well outside of the distribution of this species. The determination for this species is no impact.

B. yaaxudakeit has been found in several locations in Glacier Bay and a single plant has been found near Fairbanks. In the Yakutat area, it grows in habitats ranging from open sand on dunes and upper beaches to well-drained upper beach meadows with sandy substrates. The project area is about 350 km south of the nearest known locations.It is unlikely to occur and the determination for this species is no impact.

Appendix B

Summary of determinations

Table 5. **Threatened and Endangered Species Determinations**

Common Name	Scientific Name	ESA Status	Determinations
Aleutian shield fern	*Ploystichium aleuticum*	Endangered	No effect
Humpback whale	*Megaptera novaeangliae*	Endangered	NLAA
Blue whale	*Balaenoptera musculus*	Endangered	No effect
Bowhead whale	*Balaena mysticetus*	Endangered	No effect
Fin whale	*Balaenoptera physalus*	Endangered	No effect
Right whale	*Balaena glacialis*	Endangered	No effect
Sei whale	*Balaenoptera borealis*	Endangered	No effect
Sperm whale	*Physeter macrocephalus*	Endangered	No effect
Snake River sockeye salmon	*Onchorhynchus nerka*	Endangered	No effect
Upper Columbia River spring chinook salmon	*Onchorhynchus tshawytscha*	Endangered	No effect
Upper Columbia River steelhead	*Oncorrhynchus mykiss*	Endangered	No effect
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	No effect
Eskimo curlew	*Numenius borealis*	Endangered	No effect
Short-tailed albatross	*Phoebastria albatrus*	Endangered	No effect
Steller sea lion	*Eumetopias jubatus*	Threatened	NLAA
Snake River spring/summer chinook salmon	*Onchorhynchus tshawytscha*	Threatened	No effect
Snake River fall chinook salmon	*Onchorhynchus tshawytscha*	Threatened	No effect
Puget Sound chinook salmon	*Onchorhynchus tshawytscha*	Threatened	No effect
Lower Columbia River chinook salmon	*Onchorhynchus tshawytscha*	Threatened	No effect
Upper Willamette River chinook salmon	*Onchorhynchus tshawytscha*	Threatened	No effect
Snake River Basin steelhead	*Oncorrhynchus mykiss*	Threatened	No effect
Lower Columbia River steelhead	*Oncorrhynchus mykiss*	Threatened	No effect
Upper Willamette River steelhead	*Oncorrhynchus mykiss*	Threatened	No effect
Middle Columbia River steelhead	*Oncorrhynchus mykiss*	Threatened	No effect
Lake Ozette sockeye salmon	*Oncorrhynchus nerka*	Threatened	No effect
Spectacled eider	*Somateria fischeri*	Threatened	No effect
Steller's eider	*Polysticta stelleri*	Threatened	No effect

NLAA = not likely to adversely affect

Table 6. **Sensitive Species Determinations**

Common Name	Scientific Name	Determination
Trumpeter swan	*Cygnus buccinator*	MIIH
Queen Charlotte goshawk	*Accipiter gentilis laingi*	MIIH
Osprey	*Pandion haliaetus*	MIIH
Peale's peregrine falcon	*Falco peregrinus pealei*	NI
Goose-grass sedge	*Carex lenticularis* var. *dolia*	NI
Edible thistle	*Cirsium edule*	NI
Davy mannagrass	*Glyceria leptoctachya*	MIIH

Common Name	Scientific Name	Determination
Wright filmy fern	*Hymenophyllum wrightii*	MIIH*
Truncate quillwort	*Isoetes truncata*	NI
Calder lovage	*Ligusticum calderi*	MIIH
Bog orchid	*Platanthera gracilis*	MIIH
Loose-flowered bluegrass	*Poa laxiflora*	MIIH
Unalaska mist-maid	*Romanzoffia unalaschecensis*	MIIH
Queen Charlotte butterweed	*Senecio moresbiensis*	MIIH
Moonwort fern	*Botrychium tunux*	NI
Moonwort fern	*Botrychium yaaxudakeit*	NI
Northern pike	*Esox lucius*	NI
Fish Creek chum salmon	*Oncorhynchus keta*	NI
King Salmon River and Wheeler Creek king salmon	*Oncorhynchus tshawytscha*	NI

NI = no impact
MIIH = may impact individuals or habitat, but will not likely to contribute to a trend towards federal listing

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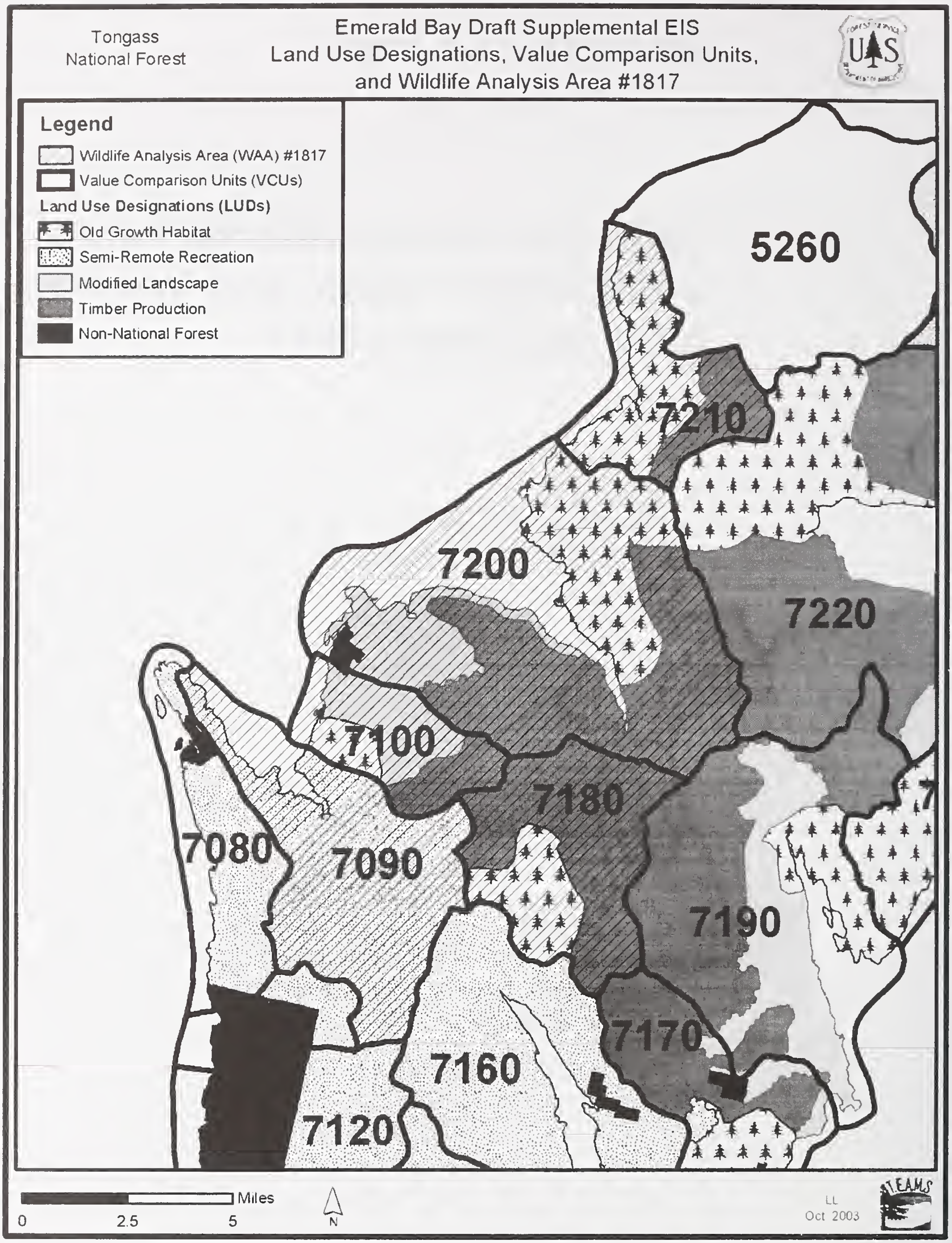
Appendix C

Maps

Appendix C: Maps

Land Use Designations, Value Comparison Units, and Wildlife Analysis Area #1817



Source: Forest Service GIS, L. LaPorta 2003

Appendix D

Unit Cards

Appendix D

Unit Cards

General Mitigation Measures

These general measures apply to all units and roads in the Emerald Bay project. The source(s) of each general measure are listed after the measure in terms of individual Forest-wide Standards and Guidelines (see Chapter 4 of the Forest Plan) or BMPs (see Appendix C of the Forest Plan and Chapter 10 of FSH 2509.22, The Soil and Water Conservation Handbook).

Air Quality Protection
Design projects to control air pollution impacts and to ensure that the predicted emissions from all pollution sources do not exceed ambient air quality standards, as specified under the Alaska Administration Code, Title 18, Chapter 50. (AIR 112).

Soil/Water Protection during Timber Sale Planning
Incorporate soil and water resource considerations into timber sale planning. Include site-specific considerations, site preparation, designating water quality protection needs on sale area maps, locating and designing landings for good drainage and dispersion of water, incorporating erosion control and timing responsibilities into the Operating Schedule, scheduling and enforcement of erosion control during and at completion of the timber sale, including non-recurring "C" provisions to protect soil and water resources in timber sale contracts, and seeking an environmental modification of the contract if new circumstances or conditions indicate that soil, water, or watershed damage may occur. (BMP 13.1, 13.2, 13.3, 13.4, 13.9, 13.10, 13.11, 13.12, 13.14, 13.17, and 13.18)

Soil/Water Protection during Road Development
Implement measures to reduce surface erosion and drainage interruption related to transportation. This includes water barring and cross-draining roads using ditches and culverts to prevent water running long distances over roads, closure, and seeding and fertilizing cut-and-fill slopes. (BMPs 14.1, 14.2, 14.3, 14.5, 14.7, 14.8, 14.9, 14.10, 14.11, 14.12, and 14.19)

Soil/Water Protection during Road Management
Conduct road maintenance and snow removal operations to minimize disruption of road surfaces, embankments, ditches, and drainage facilities, and use road closures or other measures to keep road surface and road site erosion at low or background levels. (TRAN 23-I, BMPs 14.20 and 14.23)

Management of Road Use to Reduce Erosion and Sedimentation
Control access and manage road use to reduce the risk of erosion and sedimentation from road surface disturbance especially during the higher risk periods associated with high runoff and spring thaw conditions. (BMP 14.22)

Soil/Water Protection during Development of Rock Sources, LTFs, & Other Facilities
Implement measures to reduce surface erosion and other impacts on soils and water from gravel sources and quarries, LTFs, sortyards, and other facilities. (BMPs 14.18, 14.19, 14.25, 14.26, and 14.27)

LTF Siting
Site LTFs in locations which will best avoid or minimize potential impacts on water quality, aquatic habitat, wildlife, and other resources. (TRAN 214-V, WILD 112, and BMP 14.4)

Camp and Facility Siting
Site camps and other facilities sufficiently far from important seasonal bear concentrations, raptor nest sites, and other important wildlife habitats, to avoid or minimize wildlife-human conflicts. (WILD 112).

Sanitation at Facilities
Comply with all regulations for the disposal of sewage at camps, LTFs, and other facilities; require incinerators and/or other bear-proof garbage disposal methods at work camps. (FAC 1, FAC 22, WILD 112-VI, BMP 12.10, 12.15, and 12.16).

Accidental Spills
Implement measures and plans to prevent the contamination of soil and water from accidental spills of petroleum products and hazardous substances. (BMP 12.8 and 12.9)

Heritage Site Discovery
Suspend work if a heritage site is discovered during project implementation. Authorize resumption of work only after consultation with the State Historic Preservation Office is complete.

Karst/Cave Inventory
Inventory karst landscapes and cave resources prior to initiation of project planning. (KARST-III)

Maximum Size of Created Openings
Limit created openings to a maximum size of 100 acres. (TIM 114-IV)

Maintain Advance Regeneration
Maintain advance regeneration within the unit to meet reforestation needs and stand objectives. (TIM 111-2-I)

Maintain Minor Tree Species
Selectively maintain minor species (e.g., yellow-cedar, western redcedar, Pacific yew), where appropriate for the site, as viable components of future stand, for vegetative diversity, and for seed trees. (TIM 111-2-I, TIM 114-II)

Windthrow Hazards Along the Boundaries of Protected LUDs
Take measures that protect LUDs which prohibit timber harvest activities from harvested related windthrow. (TIM 114-XII)

Certification of Reforestation
Certify that every unit that receives a final harvest meets or surpasses the stocking guidelines and certification standards (FSH 2409.17) within 5 years. (TIM 24)

Wetland Protection
Minimize the loss of all wetlands, but particularly the higher-value wetlands (especially fens), and minimize the adverse impacts of land management activities on wetlands; follow Executive Order 11990 and the BMPs. (WET-I, WET-III, BMP 12.5)

Beach and Estuary Fringe Protection
Avoid harvest within the beach and estuary fringe; avoid road construction within this zone, except where no feasible alternative exists. (BEACH 2)

Non-Development LUD Protection
Avoid timber harvest impacts and minimize road construction within non-development LUDs such as Old-growth Habitat, Remote and Semi-remote Recreation, and Wild and Scenic River corridors. Road through medium Old-growth Reserve will be built to ensure minimal impact,

closed to the public at all times, and put in storage immediately following completion of silvicultural activities.

Connectivity Between Old-growth Reserves

Provide corridors of old-growth forest between and among medium and large Old-growth Reserves. Where sufficient connectivity does not exist, or where the minimum Forest Plan criteria are not met, relocate or redesign mapped, small Old-growth Reserves. (WILD 112-XVIII)

Marine Mammal Protection

Ensure that Forest Service permitted or approved activities are conducted in a manner consistent with the Marine Mammal Protection Act, the Endangered Species Act, and National Marine Fisheries Service regulations for approaching whales, dolphins, porpoises, seals, and sea lions. Site camps, LTFs, and other facilities are to be located at least 1 mile away from known Steller sea lion haulouts. (TE&S-I)

There will be no project-related boating activity within 200 yards of Easterly Island, and no project-related air traffic within 1,500 vertical feet and 1/2 mile horizontal distance of Easterly Island.

Mapping Discrepancies

Minor discrepancies in mapping may occur, particularly when mapping various buffer widths at a scale designed to fit an 8.5 by 11 inch page. Where these discrepancies occur, the information contained in the unit card narrative applies.

Contract Provisions

Where applicable, mitigation requirements will be include as provisions of the timber sale contract.

Site-specific Mitigation Measures Incorporated into Unit and Road Design

The specific mitigation measures that are applied to selected units and/or roads in a project are identified in this section. The source(s) of each general measure are listed after the measure in terms of individual Forest-wide Standards and Guidelines (see Chapter 4 of the Forest Plan) or BMPs (see Appendix C of the Forest Plan and Chapter 10 of FSH 2509.22, The Soil and Water Conservation Handbook). These measures are listed on each unit or road card as necessary.

Minerals and Geology

M1 - Protection of Mineral Development Improvements: Protect known mineral development improvements, such as mine claim markers, by specifications in timber sale and road construction contracts. (MG 12-II)

K1 - Avoid Effects on Karst/Cave Features: Avoid road construction or modify harvest unit design to avoid impacts on karst or cave features. (KARST-III4)

Fish, Water, and Soils

F1 - Riparian Buffers: Establish no-harvest and selective cut buffers along streams and around lakes to protect riparian areas as defined by the Riparian Standards and Guidelines. Protect buffers from adjacent harvest activities (e.g., directional felling, split yarding, suspension requirements). (RIP 2, BMP 12.6)

F2 - Directional Felling Along Buffers: Trees identified for harvest will be felled to avoid riparian areas designated for ``no commercial harvest" and stream courses. (RIP 2-II)

F3 - Class III/IV Stream Protection: Split yard and directionally fall trees away from Class III and IV streams without buffers. (RIP 2-II)

F4 - Yarding Across Streams: Fully suspend logs where yarding is to be done across streams or the full length of a stream or drainage. (RIP 2-II)

F5 - Fish Passage: Maintain fish passage at Class I and II stream road crossings using properly designed stream-crossing structures (consult FSH 2090). (FISH 112-IV)

F6 - Use of Bridges: Install bridges at designated stream crossings to minimize the amount of sediment entering streams and/or to ensure good fish passage (TRAN 214-II).

F7 - Instream Construction Timing Restrictions: Implement timing restrictions for instream construction activities for the protection of anadromous and resident fish. (RIP 2-II and BMPs 14.6, 14.10, 14.14, and 14.17)

F8 - Siting of Road-Stream Crossings: Modify the location of road-stream crossings to correspond with stable stream reaches. (TRAN 214-II)

F9 - Routing of Roads near Streams: Modify road routes to avoid locations near fish-bearing streams. (TRAN 214-II)

F10 - Routing of Roads through Wetlands and Other Sensitive Areas: Modify location of Forest Development Roads to minimize impact to wetlands, floodplains, estuaries, and tidal meadows. (TRAN 214-III)

F11 - Harvesting Timber in/near Wetlands and Floodplains: Modify unit design or logging system to avoid or minimize damage to muskegs, other wetlands, or floodplains. (S&W 112-I, BMP 12.4 and 12.5)

F12 - Management of Road Use to Reduce Erosion and Sedimentation: Control access and manage road use to reduce the risk of erosion and sedimentation from road surface disturbance especially during the higher risk periods associated with high runoff and spring thaw conditions. (BMP 14.22)

F14 - Road Storage: Establish self-maintaining drainages across roads, remove bridges and reestablish natural drainage patterns, and establish vegetation cover on the road to prevent erosion during periods of inactivity. (TRAN 22-I)

F15 - Avoid Harvesting Very High Hazard Soils: Modify unit design to avoid very high mass movement areas, including slopes > 72%. (S&W 112-I, BMP 13.5)

F16 - Avoid Road Development on Very High Hazard Soils: Avoid road construction along unstable slopes, including slopes > 67%. (S&W 112-I and BMP 13.5)

F17 - Soil/Water Protection along Roads on Very High Hazard Soils: Where avoidance of road construction along unstable slopes is not possible, take special precautions with fill to prevent soil erosion, stream sedimentation, and mass wasting or require full bench construction and end hauling of excavated material. (S&W 112-I, TRAN 214-II, and BMP 14.7)

F18 - Suspension Requirements to Protect Soils: Use partial- to full-suspension logging systems in areas with high mass movement potential. (S&W 112-I, BMP 13.9)

F19 - Steep, Class IV, V-notch Streams: Establish no-harvest buffers along steep, Class IV, v-notch streams with high erosion potential (S&W 112-I, BMP 12.6 and 13.16)

Timber

T2 - Maintain Minor Tree Species: Selectively maintain minor species (e.g., yellow-cedar, western redcedar, Pacific yew), where appropriate for the site, as viable components of future stand, for vegetative diversity, and for seed trees. (TIM 111-2-I, TIM 114-II)

Wildlife and Threatened/ Endangered/ Sensitive Species

W6 - Selection Harvest: Provide for greater habitat diversity on a stand level over time by using the selection method (uneven-aged system) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (WILD 112-III)

W7 - Leaving Nonmerchantable Trees and Snags: Provide for greater habitat diversity on a stand level over time by leaving most nonmerchantable trees and snags after harvest. (WILD 112-III)

W8 - Restrictions on Helicopter Yarding: Modify helicopter yarding routes and/or timing of helicopter activity to avoid important wildlife habitats (e.g., mountain goat summer/kidding habitat or active eagle nest sites. (WILD 112-XII)

W9 - Road Closures: Close roads to motorized use to protect brown bears, wolves, marten and other large predators and furbearers from overharvest. (WILD 112)

W10 - Protection of Goshawk Nests: Avoid harvest and road construction near confirmed and probable northern goshawk nest sites according to Forest-wide Standard & Guideline TE&S-II, J, 1. (TE&S-II)

W11 - Timing of Activities and Disturbance at Goshawk Nests: Avoid continuous disturbance within 600 feet of an active goshawk nest from March 15 to August 15 (TE&S-II).

W13 - Protection of Bald Eagle Nest Trees/Other Sites and Timing of Activities: Avoid all activity, modify unit or road design, and/or limit timing of activities, near bald eagle nest trees, perch trees, and winter roost sites in accordance with the Interagency Agreement established with the U.S. Fish and Wildlife Service. (WILD 112-V)

W20 - Protection of Trumpeter Swan Nesting, Brooding, and Wintering Areas and Timing of Activities: Avoid all activity, modify unit or road design, and/or limit timing of activities, within 0.5 mile of wetlands used by nesting, brood-rearing, and wintering trumpeter swans to avoid impacts. (TE&S-II)

W24 - Protection of Wolf Dens: Maintain a 1,200-foot forested buffer, where available, around known active wolf dens. (WILD 112-XI)

W25 - Timing of Activities and Disturbance of Denning Wolves: Avoid road construction within 600 feet of known active wolf dens. (WILD 112-XI)

W28 - Management of Marten Habitat: Maintain important features of forest stand structure in harvest units in order to manage high-value marten habitat according to Forest-wide Standard & Guideline WILD 112-XVI, A, 2. (This applies to VCUs in higher risk biogeographic provinces). (WILD 112-XVI)

W29 - Rare or Endemic Terrestrial Mammals: Modify units or roads to avoid habitats supporting rare or endemic terrestrial mammals that may represent unique populations with restricted ranges. (WILD 112-XVII)

W31 - Protection of Sensitive Plant Species: Modify unit boundaries or road routing to avoid habitats supporting populations of sensitive plant species. (TE&S-II)

W32 - Protection of Candidate Species or Species of Concern: Modify units, roads, or other facilities to avoid or reduce impacts on U.S. Fish and Wildlife Service-designated Candidate species and Species of Concern. (TE&S-III)

W33 - Corridors Between Old-Growth Habitat Reserves: Avoid harvest in order to maintain corridors of old-growth forest between Old-growth Habitat Reserves and other natural setting LUDs at the landscape scale. (WILD 112-XVIII)

Heritage Resources

H1 - Avoid Direct Effects on Heritage Resource Sites: Avoid road construction or harvest unit placement in areas with heritage resource value. (HER-IV)

H2 - Avoid Indirect Effects on Heritage Resource Sites: Provide for protection from indirect effects on heritage resource sites near proposed harvest units and roads. (HER-V4)

H3 - Mitigation through Data Recovery: Mitigate valuable heritage resource sites through data recovery. (HER-IV)

Recreation and Tourism

R1- Access Restrictions for Recreation: Close or restrict access on roads to maintain remoteness of areas after harvest (REC 112-II)

Scenery

V5 - Patch/Strip Clearcutting: Reduce visual contrast with adjacent areas by using patch or strip clearcutting (two-aged or uneven-aged systems) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (VIS 11-III)

V6 - Selection Harvest: Reduce visual contrast with adjacent areas by using the selection method (uneven-aged system) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (VIS 11-III)

V7 - Leaving Nonmerchantable Trees: Reduce visual contrast with adjacent areas by leaving most nonmerchantable trees after harvest. (VIS 11-III)

V8 - Modification of Unit Boundaries: Modify unit boundaries to assure that the harvest unit meets the proposed VQO in partial retention and retention areas. (VIS 11-II)

V9 - Treatment of Rock Sources: Locate rock sources off the road along Visual Priority Routes, so that rock source development is not apparent from the road and/or use a landscape architect in the planning/design of rock pits. (VIS 11-II)

V10 - Roadside Cleanup: Provide for roadside cleanup of ground-disturbing activities in partial retention and retention areas. (VIS 11-II)

V11 - LTF Design: Use low profile LTF design to minimize visibility from Visual Priority Travel Routes and Use Areas. (VIS 11-II)

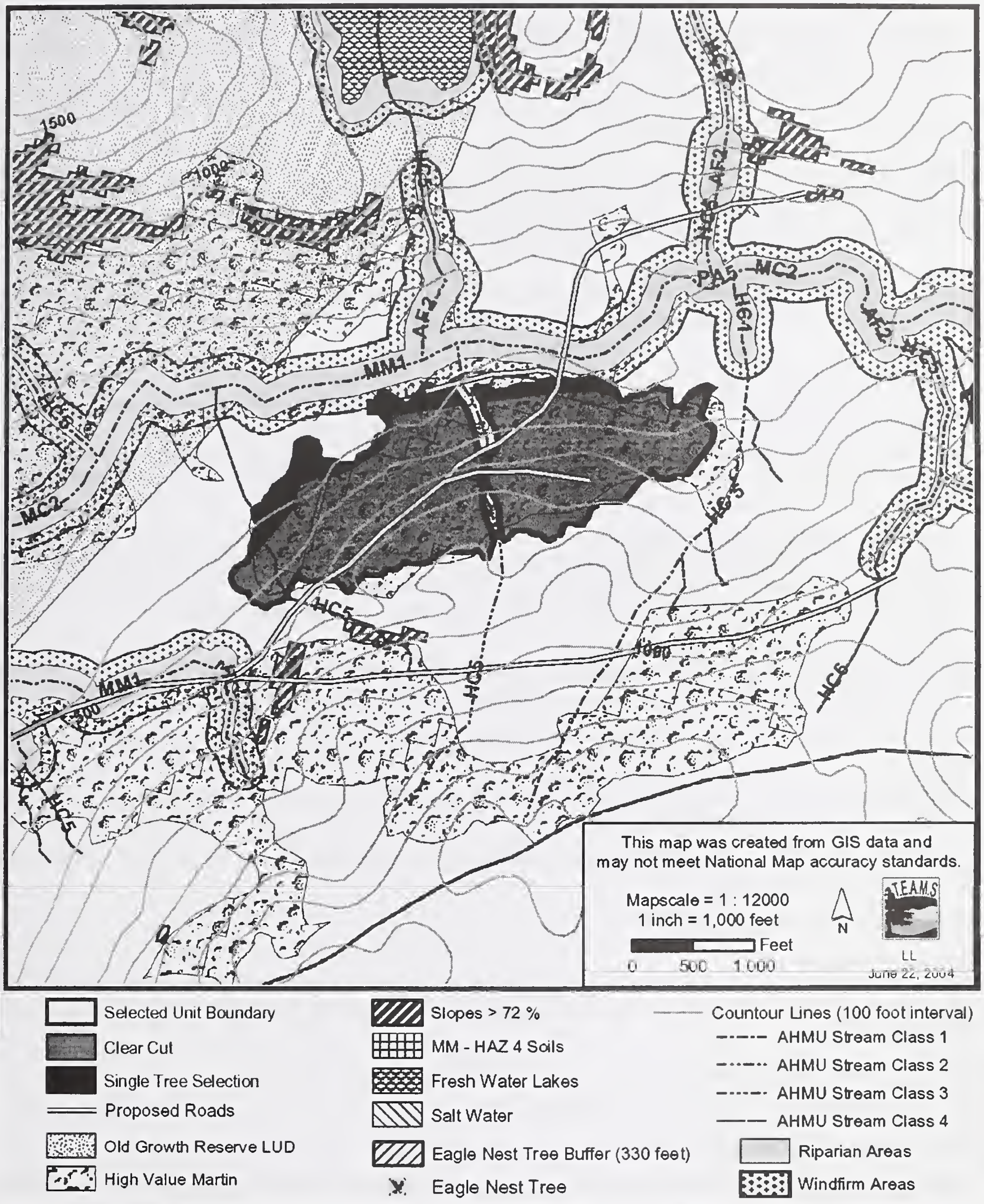
V12 - Temporary LTFs: Use temporary LTF and incorporate rehabilitation measures into project analysis and the contract package to reduce long-term visual effects in partial retention areas. (VIS 11-II)

Subsistence

S1 - Access Restrictions for Subsistence: Close or restrict access on roads to maintain remoteness of areas after harvest to address subsistence issues. (SUB-I)

Tongass
National Forest

Emerald Bay Project Area
Unit Card – Alternative B
7210-1



Emerald Bay Project Alternative B Unit Card

Unit 1

Harvest Acres:	88	MBF Volume:	2361	CCF Volume:	4722
Aerial Photo:	1973	Flight #:	29	Photo #:	31

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 77 acres of high value marten habitat; 72 acres to be clearcut and 5 acres of single-tree selection. Marten guidelines to apply in clearcut area: maintain 10-20 percent of original stand structure, average 4 large trees/acre (20-30"+), average 3 snags per acre, average 3 pieces downed logs/acre (20-30"+). (W28)

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
There are approximately 14 acres of Forested Wetlands in the northwest corner of Unit 1a. Most of the wetland area is planned for shovel yarding and single-tree selection. Shovel yarding needs to follow the guidelines documented in BMP 13.9. Bearing strength of the soils in the area is low. There are inclusions of forested organic soils in the unit. Suitability for shovel yarding will be somewhat dependant on soil moisture. Shovel yarding should only take place in the summer when soil moisture contents are low and bearing strengths higher. A running skyline system with a minimum of partial suspension is preferred if it can be accomplished without additional road (BMP 12.5).

Landslide Prone Soils Landslide Prone Soils
The soils in Unit 1 lie on slopes less than 60 percent gradient and are not landslide prone. Soils mapped are deep and somewhat erodible. BMP 12.17, "Revegetation of Disturbed Areas" should be used to treat any areas disturbed during the yarding process. Partial suspension is required in the cable yard portion of the unit (BMP 13.9).

Fisheries/Hydrology
The north boundary of Units 1a and 1b are adjacent to the stream buffer on Emerald Creek. The riparian area is defined by a timber type change. A windfirm boundary needs to be established next to the no-cut buffer.

Class IV HC5 flows through southwest Unit 1a corner. Directional felling, split yarding, and full suspension may be required.

Class II MM1 adjacent to north boundary of Units 1a and 1b: greater of 120 foot or RMA buffer required, additional 120 foot select harvest windfirm buffer required.

Class II PA5 adjacent to Unit 1a northwest boundary: greater of 100 foot or RMA buffer required; additional 85 foot select harvest windfirm buffer required.

Follow BMPs 12.6, 12.6a and 13.16.

Silvicultural Prescription
Unit 1a: Use single-tree selection to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

B. All Hemlock 0-14 inches dbh and over 40 inches dbh.

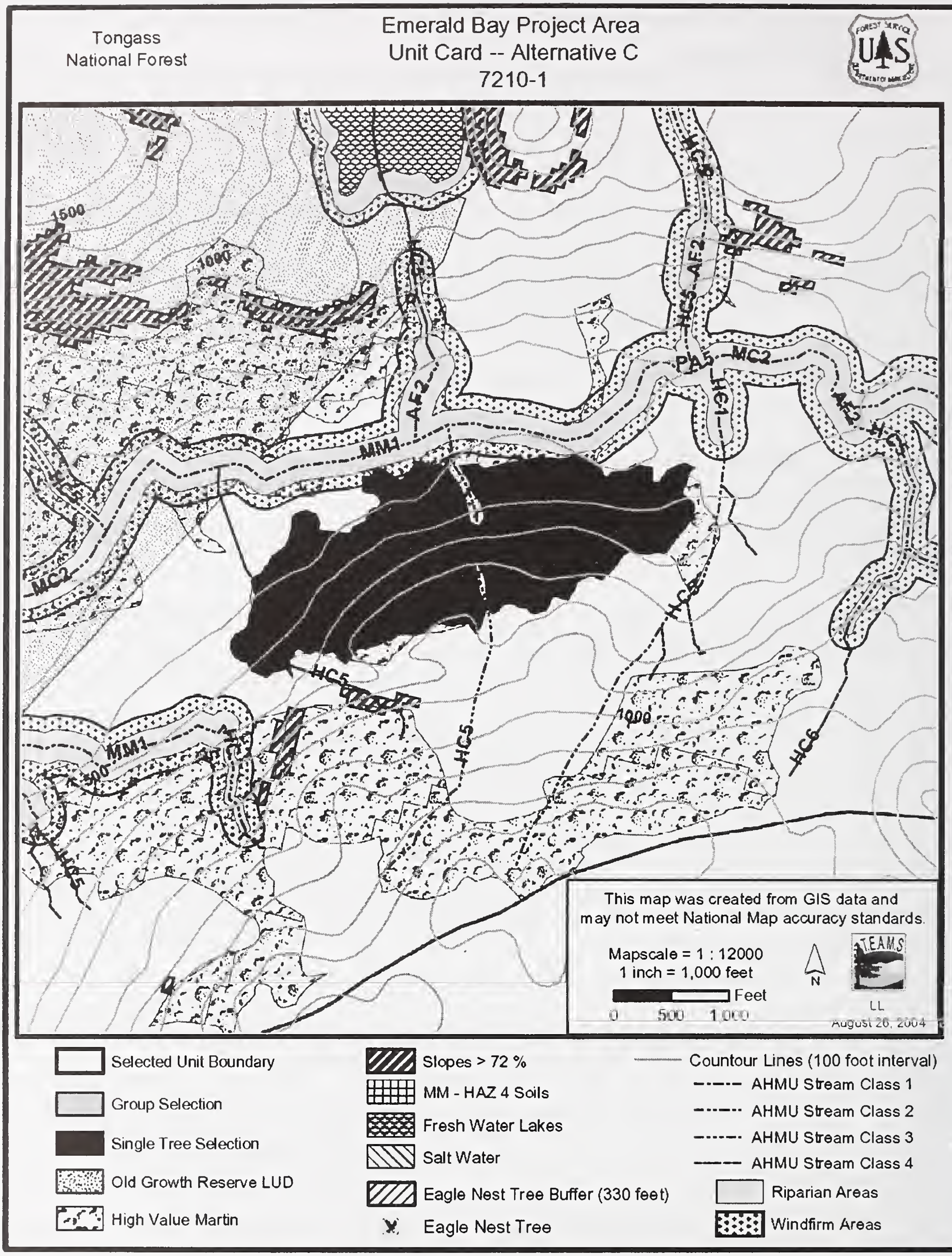
Unit 1b: Clearcut and clearcut with reserves

Clearcut is the optimum method of harvest where prescribed: Lands proposed for clearcut are in the Timber Production LUD where a management goal is to maintain and promote industrial wood production (USDA FS 2001). Clearcutting is a recommended harvest where timber production is the primary purpose because logging costs are lower than with other systems; site exposure to the sun raises soil temperature, which speeds decomposition or mor, thereby improving site productivity; clearcutting favors the regeneration of Sitka spruce, a desireable timber species; the thin bark and shallow roots

of hemlock and spruce make them susceptible to logging injury, which leads to decay, especially in hemlock, and clearcutting minimizes this damage and volume loss (Burns, R. 1983).

Logging System and Unit Design
Cable log using running skyline with partial suspension for all of Unit 1b and the northwest portion of Unit 1a. Shovel yard the remainder of Unit 1a.

Transportation


Tongass
National Forest
Emerald Bay Project Area
Unit Card -- Alternative C
7210-1
1500
1000
MM1
MC2
AF2
HC5
HC1
HC6
PA5
500
This map was created from GIS data and
may not meet National Map accuracy standards.
Mapscale = 1 : 12000
1 inch = 1,000 feet
Feet
0 500 1,000
N
LL
August 26, 2004
Selected Unit Boundary
Group Selection
Single Tree Selection
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative C Unit Card

Unit 1

Harvest Acres:	88	MBF Volume:	1791	CCF Volume:	3582
Aerial Photo:	1973	Flight #:	29	Photo #:	31

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 77 acres of high value marten habitat to be treated with single-tree selection. (W28)

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
There are approximately 14 acres of Forested Wetlands in the northwest corner of Unit 1a. The wetland area is planned for helicopter yarding and single-tree selection. Full suspension and single-tree selection will easily meet the resource objectives outlined in BMPs 12.5 and 13.9.

Landslide Prone Soils
The soils in Unit 1 lie on slopes less than 60 percent gradient and are not landslide prone. Soils mapped are deep and somewhat erodible. A minimum of partial suspension is required. Full suspension and single-tree selection is planned, and meets BMP 13.9.

Fisheries/Hydrology
The north unit boundary is adjacent to the stream buffer on Emerald Creek. The riparian area is defined by a timber type change. A windfirm boundary needs to be established next to the no-cut buffer.

Class IV HC5 flows through southwest unit corner. Directional felling, split yarding, and full suspension may be required.

Class II MM1 adjacent to north unit boundary: greater of 120 foot or RMA buffer required, additional 120 foot select harvest windfirm buffer required.

Class II PA5 adjacent to north boundary: greater of 100 foot or RMA buffer required; additional 85 foot select harvest windfirm buffer required.

Follow BMPs 12.6, 12.6a and 13.16.

Silvicultural Prescription (Single-tree & Group Selection)
Use Single-tree Selection to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

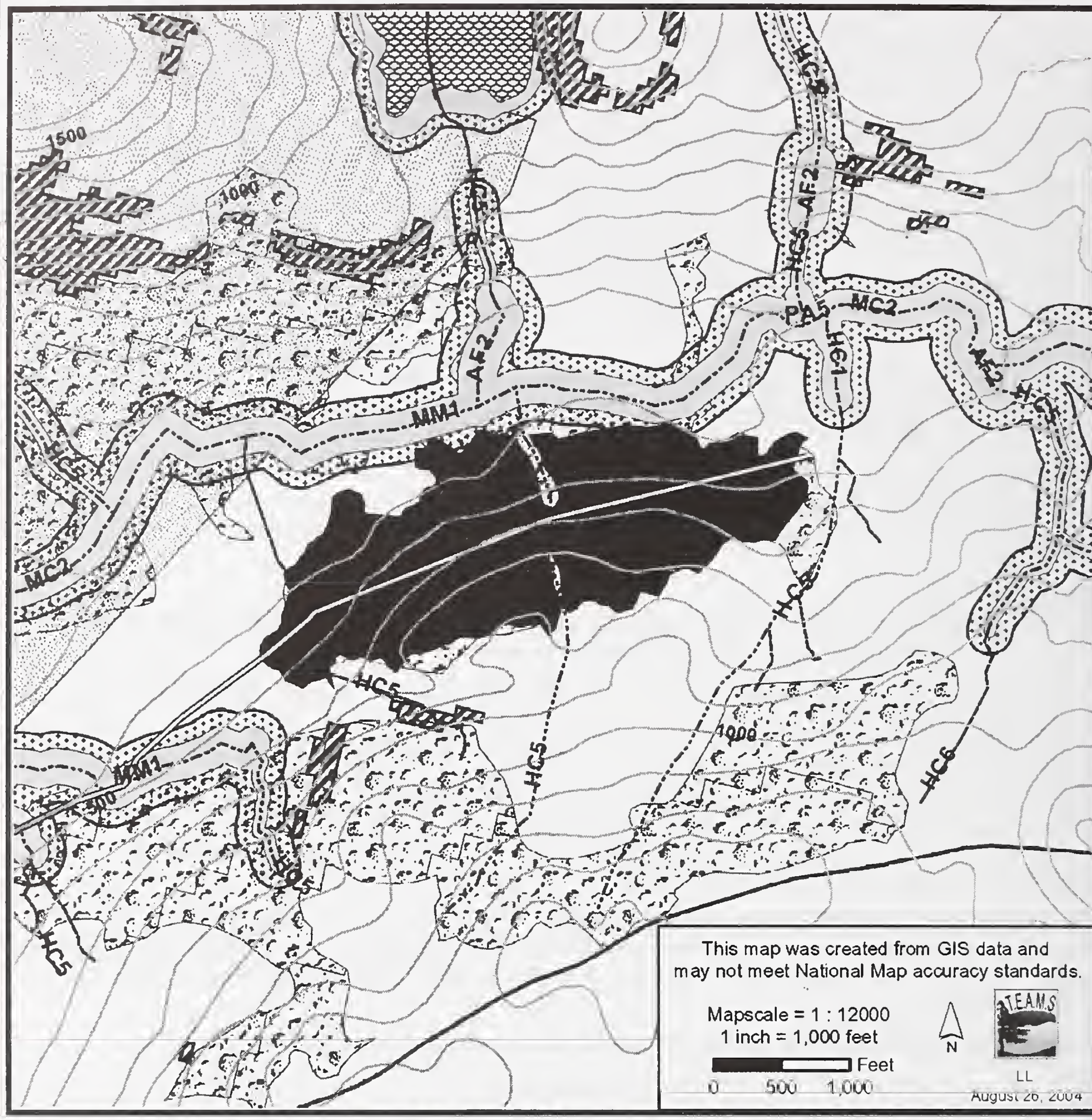
Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

B. All Hemlock 0-14 inches dbh and over 40 inches dbh.

Logging System and Unit Design
Helicopter harvest to a barge in Emerald Bay.

Tongass National Forest

Emerald Bay Project Area
Unit Card -- Alternative D
7210-1



- Selected Unit Boundary
- Group Selection
- Single Tree Selection
- Proposed Roads
- Old Growth Reserve LUD
- High Value Martin
- Slopes > 72 %
- MM - HAZ 4 Soils
- Fresh Water Lakes
- Salt Water
- Eagle Nest Tree Buffer (330 feet)
- Eagle Nest Tree
- Countour Lines (100 foot interval)
- AHMU Stream Class 1
- AHMU Stream Class 2
- AHMU Stream Class 3
- AHMU Stream Class 4
- Riparian Areas
- Windfirm Areas

Emerald Bay Project Alternative D Unit Card

Unit 1

Harvest Acres:	88	MBF Volume:	1,595	CCF Volume:	3,393
Aerial Photo:	1973	Flight #:	29	Photo #:	31

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 77 acres of high value marten habitat to be treated with single-tree selection. (W28)

Scenery
No impacts to visual quality are anticipated.

Wetlands
There are approximately 14 acres of Forested Wetlands in the northwest corner of unit. The proposed helicopter yarding in conjunction with single-tree selection prescription will provide the necessary resource protection (BMP 12.5) (F11)

Soils
The soils within the unit lie on slopes less than 60 percent gradient and are not landslide prone. Mapped soils are deep and somewhat erodible. Helicopter yarding in conjunction with single-tree selection will provide adequate resource protection (BMP 13.9). Should any cable-yarding systems be used, partial suspension requirements are to be implemented. (F18)

Fisheries/Hydrology
The north unit boundary is adjacent to the stream buffer on Birch Creek. The riparian area is defined by a timber type change. A windfirm boundary has been established next to the no-cut buffer.

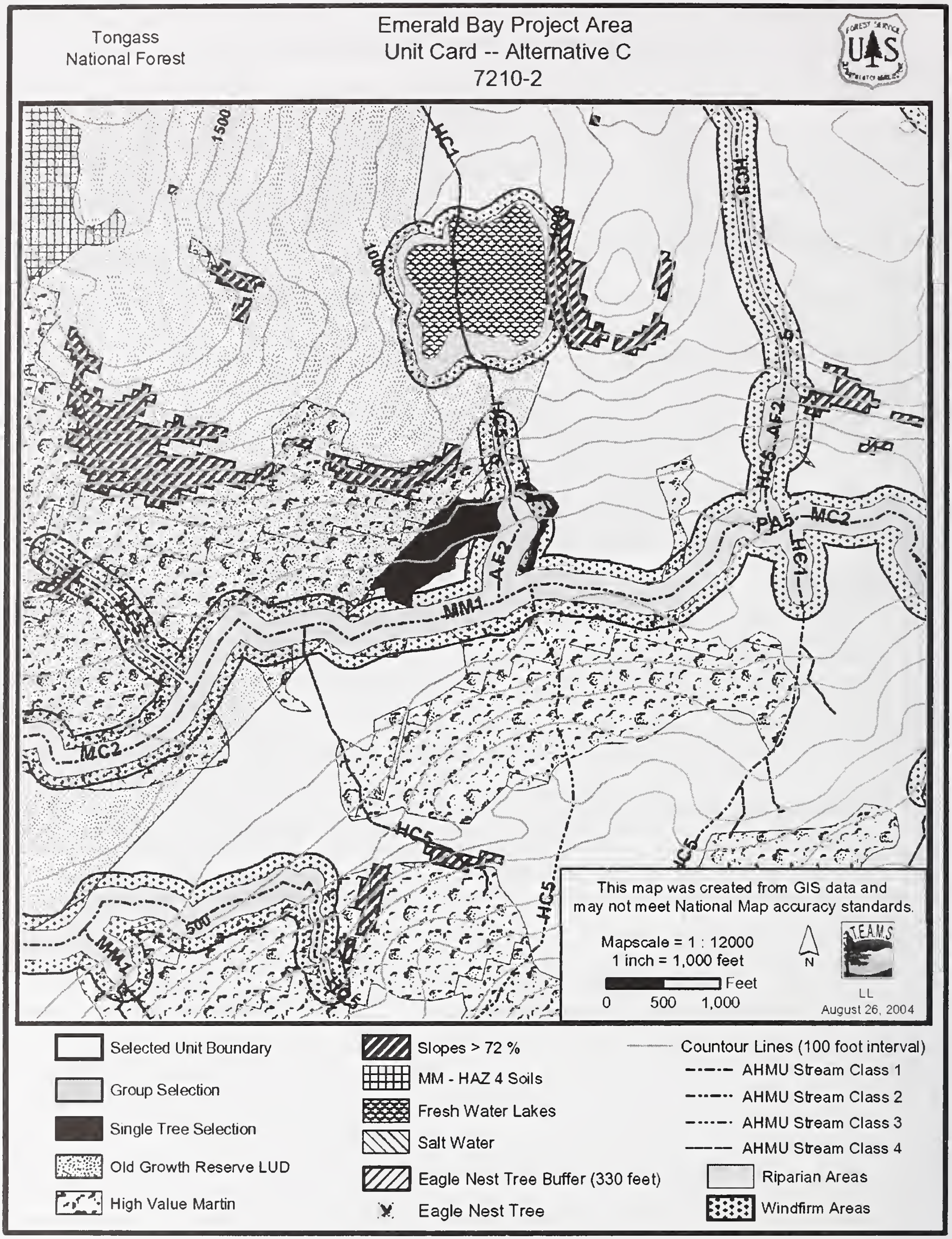
Class II MM1 adjacent to north unit boundary: Greater of 120 foot or RMA buffer required. (F1, F2)
Class II PA5 flows through the middle of the unit: 100-foot buffer required. Upper reaches a Class III HC5 requires slope break buffer. (F1, F2)
Class III HC5 on east side of unit; requires slope break buffer. (F1, F2)
Class IV HC5 flows through southwest unit corner. Directional felling and split yarding. Follow BMPs 12.6, 12.6a and 13.16. (F)

Silvicultural Prescription (Single-tree Selection)
Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system. Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:
Single-tree Selection (88 acres)

Use single-tree selection to remove:

A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

Logging System and Unit Design
Helicopter harvest to road.


Tongass
National Forest
Emerald Bay Project Area
Unit Card -- Alternative C
7210-2
1500
1000
500
HC1
HC8
HC5
AF2
MM1
MC2
PA5
HC1
MM1
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Mapscale = 1 : 12000
1 inch = 1,000 feet
Feet
0 500 1,000
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LL
August 26, 2004
Selected Unit Boundary
Group Selection
Single Tree Selection
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative C Unit Card

Unit 2

Harvest Acres: 11 MBF Volume: 163 CCF Volume: 326
Aerial Photo: 1973 Flight #: 28 Photo #: 216

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 8 acres of high value marten habitat; 1 acre of group selecton and 7 acres of single-tree selection. (W28)

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
Unit 2 is mapped as a Forested Upland and Forested Wetland complex on gently sloping ground. A minimum of partial suspension is required (BMP 12.5 and 13). Full suspension is planned for with single-tree selection.

Landslide Prone Soils
The soils in Unit 2 have a low landslide potential. Erosion potential is also fairly low (see hydrology section).

Fisheries/Hydrology
Unit 2 has three polygons: 2a, 2b, and 2c. Polygon 2a is west of an alluvial/colluvial fan, 2b is located on a portion of the inactive AF2 fan, and 2c is east of the fan. The northern tips of 2a and 2c are next to a shallowly incised bedrock and colluvial-controlled Class III HC5 channel. An single-tree harvest that will leave approximately 50 percent of the trees is planned for 2a and 2c. This harvest method used outside the no-cut buffers will provide a reasonable assurance of windfirmness for the AF2 and HC5 channels.

Class III AF2 adjacent to 2a, 2b and 2c boundaries: a buffer that is the greater of 140 foot or active portion of alluvial fan is required. For polygon 2b, 10 percent of the trees that are greater than 140 feet from active channels may be removed.

Class III HC5 adjacent to 2a and 2c: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Follow BMPs 12.6, 12.6a and 13.9.

Silvicultural Prescription (Single-tree & Group Selection)
Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system. Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:

Single-tree Selection (9 acres)

Use single-tree selection to remove all trees as described below:

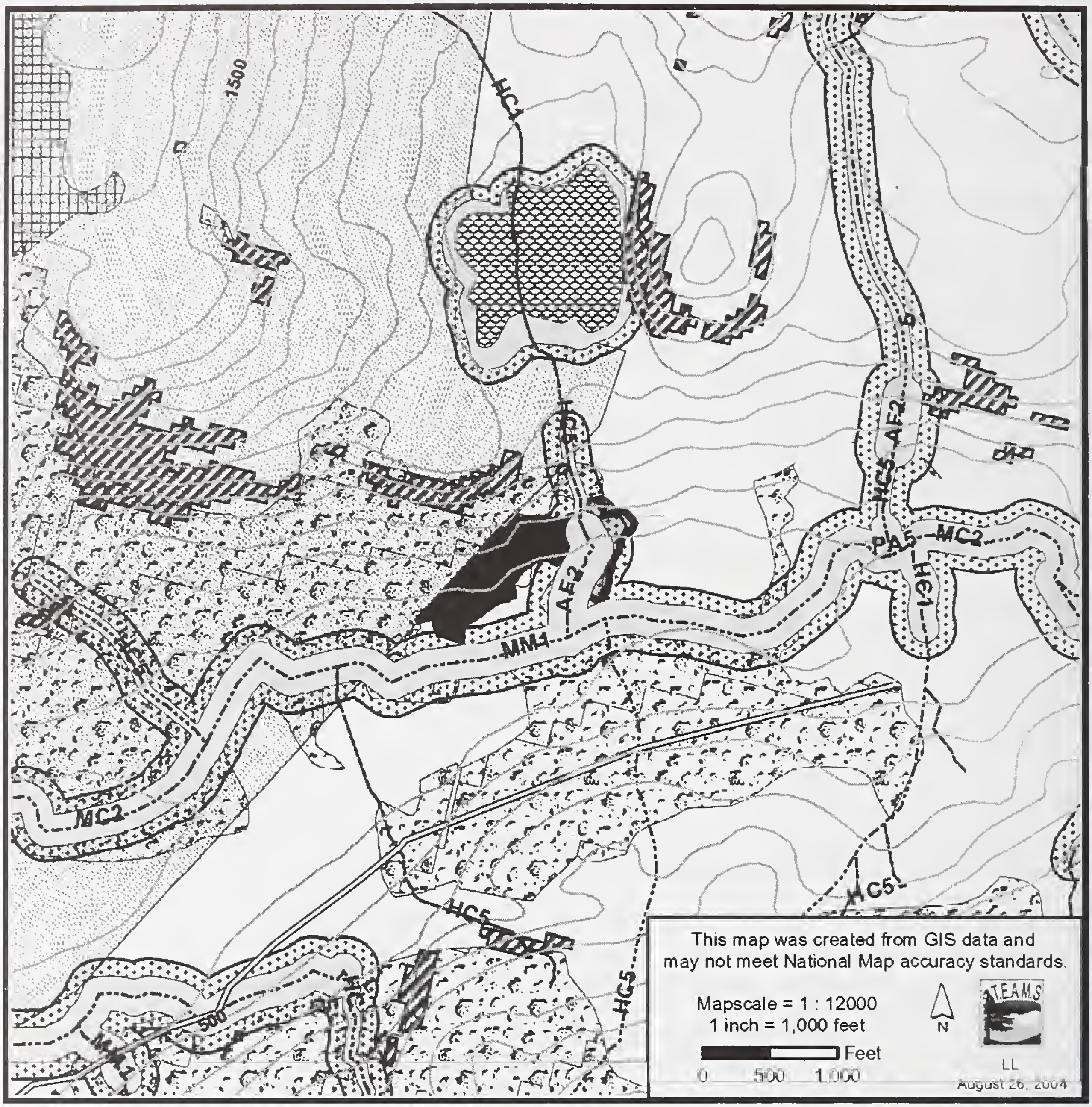
A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

Group Selection (2 acres)
Target basal area will be removed in groups, the resulting openings not to exceed 2 acres in size.

Logging System and Unit Design
Helicopter harvest to a barge in Emerald Bay.

Tongass
National Forest

Emerald Bay Project Area
Unit Card -- Alternative D
7210-2



- Selected Unit Boundary
- Group Selection
- Single Tree Selection
- Proposed Roads
- Old Growth Reserve LUD
- High Value Martin
- Slopes > 72 %
- MM - HAZ 4 Soils
- Fresh Water Lakes
- Salt Water
- Eagle Nest Tree Buffer (330 feet)
- Eagle Nest Tree
- Countour Lines (100 foot interval)
- AHMU Stream Class 1
- AHMU Stream Class 2
- AHMU Stream Class 3
- AHMU Stream Class 4
- Riparian Areas
- Windfirm Areas

Emerald Bay Project Alternative D Unit Card

Unit 2

Harvest Acres:	11	MBF Volume:	287	CCF Volume:	610
Aerial Photo:	1973	Flight #:	28	Photo #:	216

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 8 acres of high value marten habitat; 1 acre of group selecton and 7 acres of single-tree selection. (W28)

Scenery
No impacts to visual quality are anticipated.

Wetlands
Unit is mapped as a Forested Upland and Forested Wetland complex on gently sloping ground. Helicopter yarding in conjunction with single-tree selection prescription will provide protection to the wetland resources (BMP 12.5 and 13). (F11)

Soils
The soils within the unit have a low landslide potential. Erosion potential is also fairly low (see Hydrology – Chapter 3).

Fisheries/Hydrology
The northern tips of unit are next to a shallowly incised bedrock and colluvial-controlled Class III HC5 channel.

Class II AF2: a buffer that is the greater of 140 foot or active portion of alluvial fan is required. (F1, F2)
Class III HC5: no timber harvest within the V-notch, slopebreak buffer required. Follow BMPs 12.6, 12.6a, 13.9. (F1, F2)

Silvicultural Prescription (Single-tree and Group Selection)
Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system. Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:

Single-tree Selection (9 acres)

Use single-tree selection to remove all trees as described below:

A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

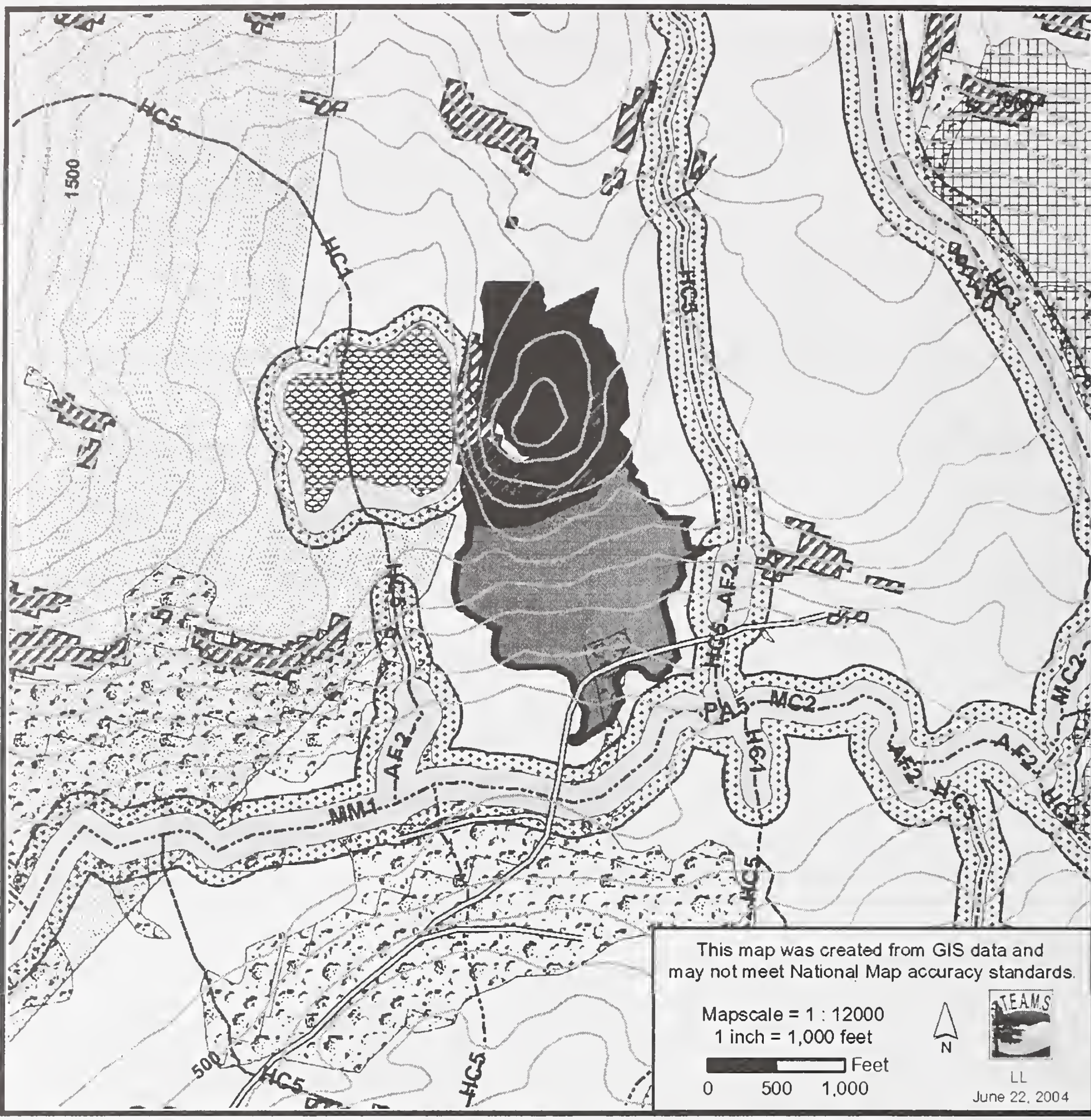
Group Selection (2 acres)

Target basal area will be removed in groups, the resulting openings not to exceed 2 acres in size.

Logging System and Unit Design
Helicopter harvest to road.

Tongass
National Forest

Emerald Bay Project Area
Unit Card – Alternative B
7210-3



Selected Unit Boundary
Clear Cut
Single Tree Selection
Proposed Roads
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative B Unit Card

Unit 3

Harvest Acres:	76	MBF Volume:	1617	CCF Volume:	3234
Aerial Photo:	1973	Flight #:	29	Photo #:	32

Resource Concerns and Mitigation

Wildlife

This unit unit incudes 2 acres of high value marten habitat to be clearcut. Marten guidelines to apply in clearcut area: maintain 10-20 percent of original stand structure, average 4 large trees/acre (20-30"+), average 3 snags per acre, average 3 pieces downed logs/acre (20-30"+). (W28)

Scenery

This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands

Almost all of Unit 3 lies on a Forested Wetland and Forested Upland complex. The wetlands occur on moderately sloping to steep mineral soils. A minimum of partial suspension is required. The unit is planned for slackline and helicopter yarding, which will meet resource objectives (BMP 12.5 and 13.9).

Landslide Prone Soils

Soils in Unit 3 are steep with an estimated 15 acres on slopes over 72 percent gradient. To meet soil resource concerns, four of the acres are in a leave island and the remaining slopes over 72 percent are in a partial cut helicopter yard setting (BMPs 13.5, 13.9, and 13.2). Partial suspension is required in the cable log portion of the unit (BMP 13.9).

Fisheries/Hydrology

Unit 3 borders Emerald Creek to the south and a water-quality stream to the east. The Class III water-quality stream has formed a small alluvial deposit on the eastern boundary of Unit 3; the no-cut buffer should include the alluvium deposit.

Class III HC5 adjacent to east unit boundary: no timber harvest within the V-notch or on the alluvium deposit, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak/alluvium for windfirmness.

Class II HC1 adjacent to southeast unit corner: no harvest within the greater of 100 feet or the V-notch; manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness

Class II PA5 adjacent to south boundary: greater of 100 foot or RMA buffer required; additional 85 foot select harvest windfirm buffer required.

Follow BMPs 12.6, 12.6a and 13.16.

Silvicultural Prescription

Single-tree selection on approximately 34 acres at the north end of the unit. Use single-tree selection to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

B. All Hemlock 0-14 inches dbh and over 40 inches dbh.

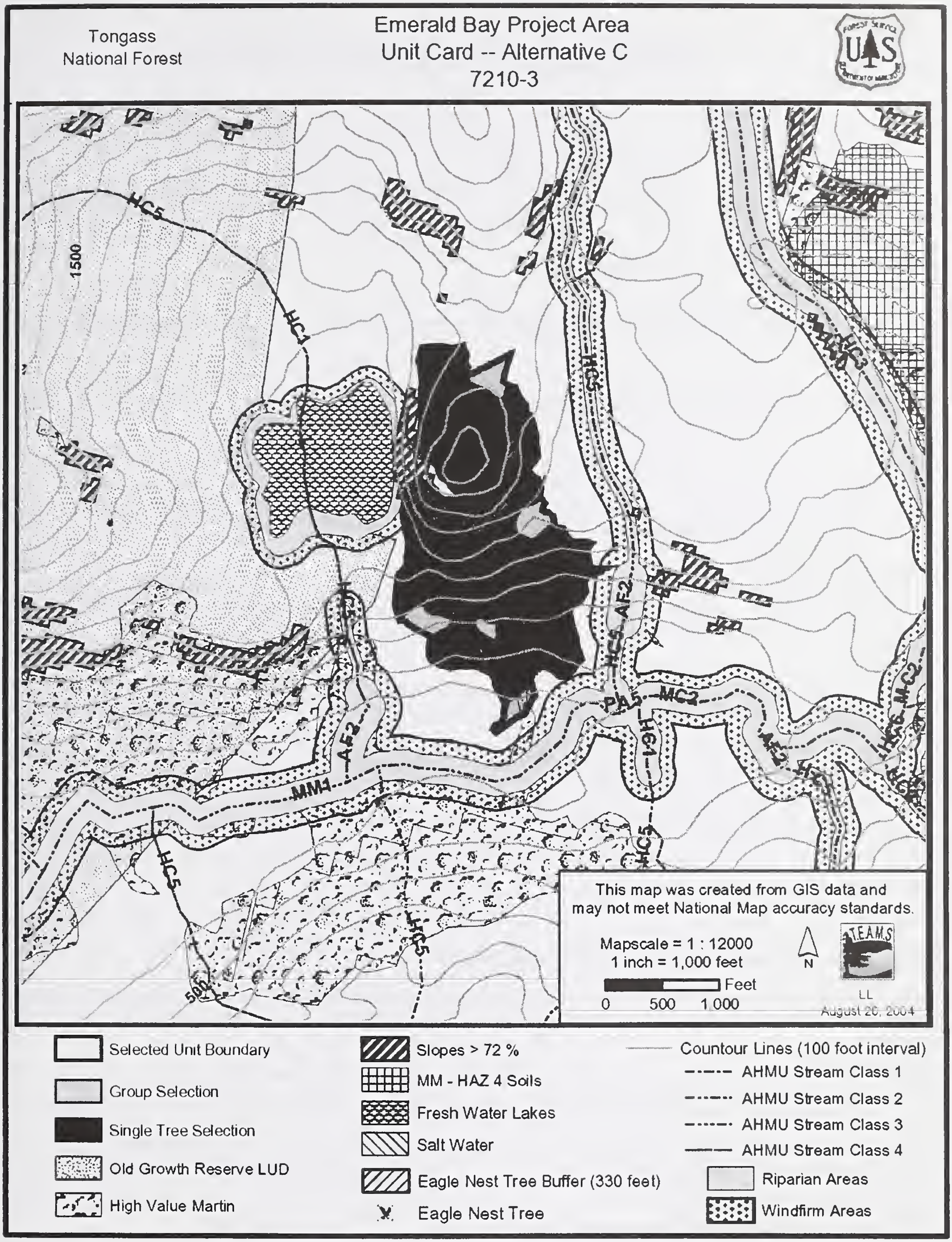
Clearcut and clearcut with reserves: Approximately 42 acres.

Clearcut is the optimum method of harvest where prescribed: Lands proposed for clearcut are in the Timber Production LUD where a management goal is to maintain and promote industrial wood production (USDA FS 2001). Clearcutting is a recommended harvest where timber production is the primary purpose because logging costs are lower than with other systems; site exposure to the sun raises soil temperature, which speeds decomposition or mor, thereby improving site productivity; clearcutting favors the regeneration of Sitka spruce, a desireable timber species; the thin bark and shallow roots of hemlock and spruce make them susceptible to logging injury, which leads to decay, especially in hemlock, and clearcutting minimizes this damage and volume loss (Burns, R. 1983).

Logging System and Unit Design

Helicopter yard 28 acres in the northern end of the unit to the road.

Cable yard with running skyline the remaining 48 acres.


Tongass
National Forest
Emerald Bay Project Area
Unit Card -- Alternative C
7210-3
HC5
HC1
1500
AF2
MM1
PA5
MC2
500
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Mapscale = 1 : 12000
1 inch = 1,000 feet
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Feet
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August 20, 2004
Selected Unit Boundary
Group Selection
Single Tree Selection
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative C Unit Card

Unit 3

Harvest Acres: 76 MBF Volume: 988 CCF Volume: 1976
Aerial Photo: 1973 Flight #: 29 Photo #: 32

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 2.4 acres of high value marten habitat; 2 acres to be treated with single-tree selection and 0.4 acres of group selection. (W28)

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
Almost all of unit 3 lies on a Forested Wetland and Forested Upland complex. The wetlands occur on moderately sloping to steep mineral soils. A minimum of partial suspension is required. The unit is planned for individual tree mark leaving 50 percent of the trees and helicopter yarding, which will meet resource objectives (BMP 12.5 and 13.9).

Landslide Prone Soils
Soils in Unit 3 are steep with an estimated 15 acres on slopes over 72 percent gradient. To meet soil resource concerns, 4 of the acres are in a leave island and the remaining slopes over 72 percent are in a partial cut helicopter yard setting (BMPs 13.5, 13.9, and 13.2). A minimum of partial suspension is required in the reminder of the unit (BMP 13.9).

Fisheries
Unit 3 borders Emerald Creek to the south and a water-quality stream to the east. The Class III water quality stream has formed a small alluvial deposit on the eastern boundary of Unit 3; the no-cut buffer should include the alluvium deposit.

Class III HC5 adjacent to east unit boundary: no timber harvest within the V-notch or on the alluvium deposit, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak/alluvium for windfirmness.

Class II HC1 adjacent to southeast unit corner: no harvest within the greater of 100 feet or the V-notch; manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness

Class II PA5 adjacent to south boundary: greater of 100 foot or RMA buffer required; additional 85 foot select harvest windfirm buffer required.

Follow BMPs 12.6, 12.6a and 13.16.

Silvicultural Prescription (Single-tree and Group Selection)

Use single-tree selection to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

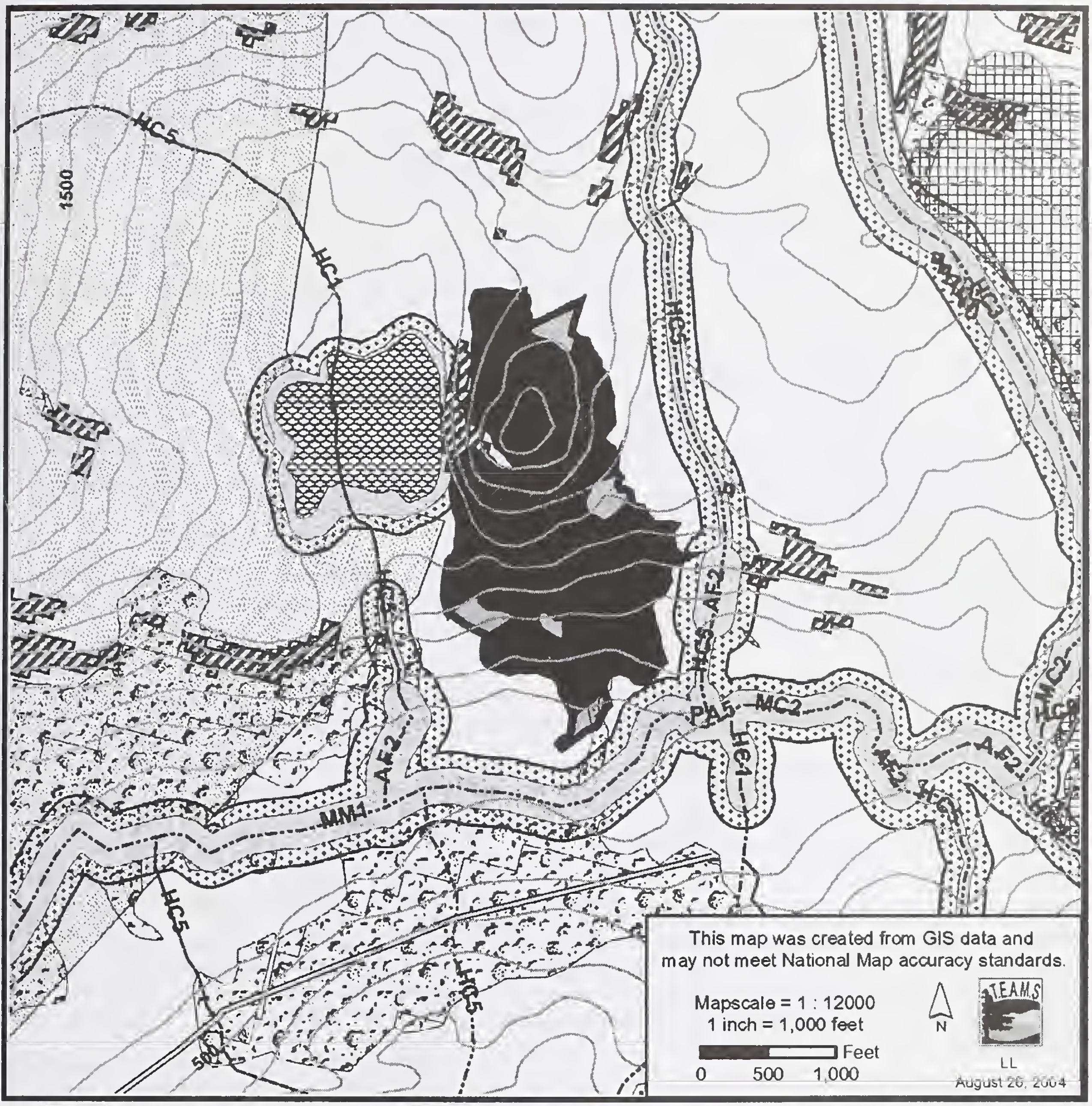
B. All hemlock 0-14 inches dbh and over 40 inches dbh.

Harvest approximately 8 acres using Group Selection removing all merchantable trees from areas ranging from 1/4 to 2 acres in size. Leave at least 200 feet between groups.

Logging System and Unit Design
Helicopter harvest to a barge in Emerald Bay.

Tongass
National Forest

Emerald Bay Project Area
Unit Card -- Alternative D
7210-3



- Selected Unit Boundary
- Group Selection
- Single Tree Selection
- Proposed Roads
- Old Growth Reserve LUD
- High Value Martin
- Slopes > 72 %
- MM - HAZ 4 Soils
- Fresh Water Lakes
- Salt Water
- Eagle Nest Tree Buffer (330 feet)
- Eagle Nest Tree
- Countour Lines (100 foot interval)
- AHMU Stream Class 1
- AHMU Stream Class 2
- AHMU Stream Class 3
- AHMU Stream Class 4
- Riparian Areas
- Windfirm Areas

Emerald Bay Project Alternative D Unit Card

Unit 3

Harvest Acres:	76	MBF Volume:	1,272	CCF Volume:	2,707
Aerial Photo:	1973	Flight #:	29	Photo #:	32

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 2.4 acres of high value marten habitat; 2 acres to be treated with single-tree selection and 0.4 acres of group selection. (W28)

Scenery
No impacts to visual quality are anticipated.

Wetlands
Almost the entire unit lies on a Forested Wetland and Forested Upland complex. The wetlands occur on moderately sloping to steep mineral soils. Resource objectives will be met by helicopter yarding in conjunction with single-tree selection prescription (BMP 12.5 and 13.9). (F11)

Soils
Soils within the unit are steep with an estimated 15 acres on slopes over 72 percent gradient. Per recommendation by soils scientist, 4 of the 15 acres have been placed a leave island and the remaining slopes over 72 percent are will be harvested using single-tree selection helicopter yarding. (BMPs 13.5, 13.9, and 13.2). (F18)

Fisheries/Hydrology
Unit borders Birch Creek to the south and a water-quality stream to the east. The Class III water quality stream has formed a small alluvial deposit on the eastern boundary; the no-cut buffers include the alluvium deposit.

Class II HC1 adjacent to southeast unit corner: no harvest within the greater of 100 feet or the V-notch. (F1, F2)
Class III HC5 adjacent to east unit boundary: no timber harvest within the V-notch or on the alluvium deposit, slopebreak buffer required. (F1, F2)
Class II PA5 adjacent to south boundary: greater of 100 foot or RMA buffer required. Follow BMPs 12.6, 12.6a and 13.16. (F1, F2)

Silvicultural Prescription (Single-tree and Group Selection)
Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system. Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:

Single-tree Selection (68 acres)

Use single-tree selection to remove all trees as described below:

A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

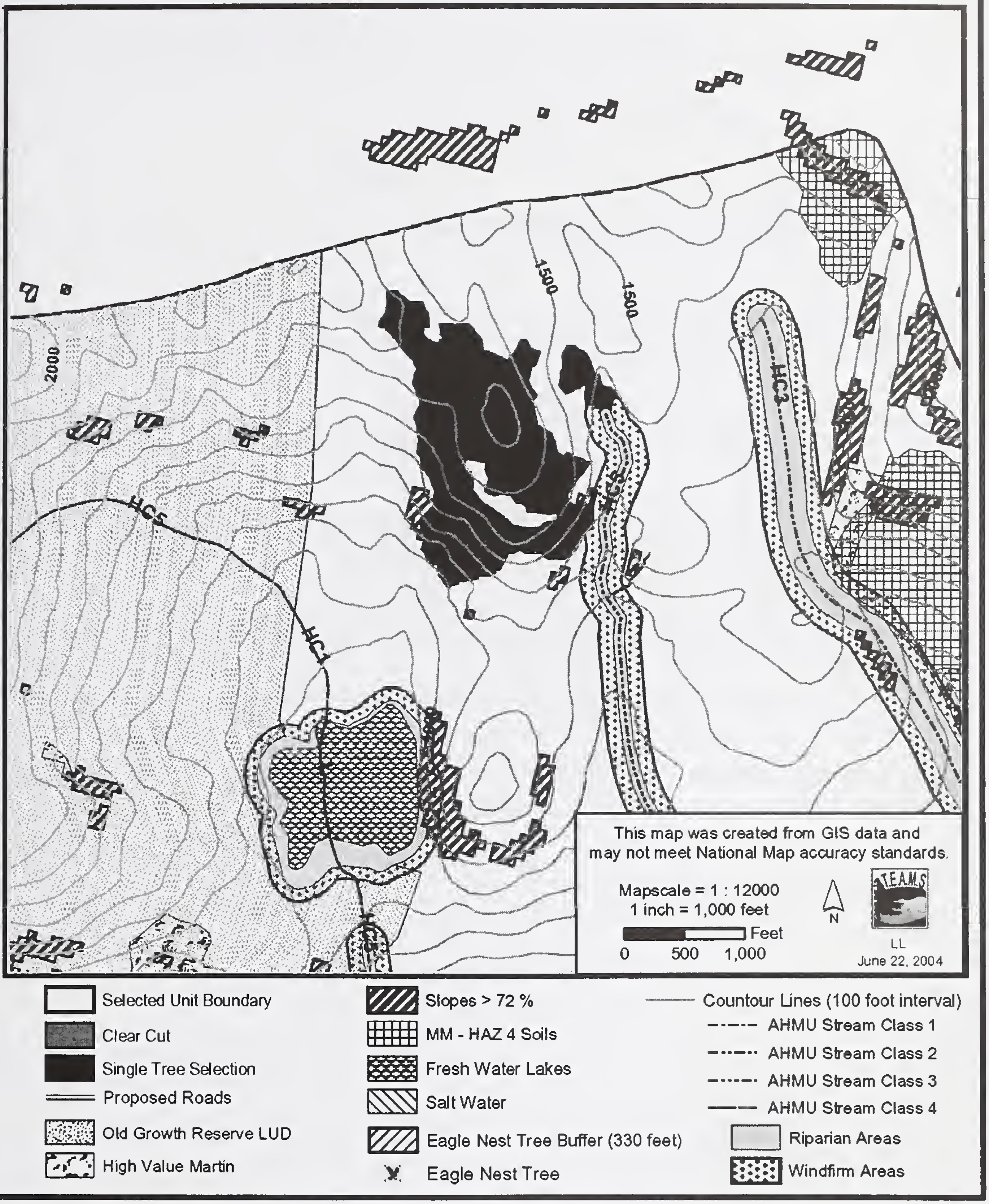
Group Selections will be applied to five areas (8 acres).

Target basal area will be removed in groups, the resulting (five) openings not to exceed 2 acres in size.

Logging System and Unit Design
Helicopter harvest to road.

Tongass
National Forest

Emerald Bay Project Area
Unit Card – Alternative B
7210-5



Emerald Bay Project Alternative B Unit Card

Unit 5

Harvest Acres: 50 MBF Volume: 1050 CCF Volume: 2100
Aerial Photo: 1973 Flight #: 29 Photo #: 32

Resource Concerns and Mitigation

Wildlife

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
All of Unit 5 is mapped as a complex of Forested Wetlands and Forested Uplands. The Forested Wetlands are on mineral soils on moderately to steeply sloping ground. Unit 5 is planned for helicopter yarding with full suspension, which will meet resource objectives outlined in BMP 12.5 and 13.9.

Landslide Prone Soils
There is approximately 1 acre of slopes greater than 72 percent gradient in Unit 5. The pitch is very short and landslide potential appears to be low (BMP 13.5). A minimum of partial suspension is required, and full suspension is planned via helicopter yarding (BMP 13.9).

Fisheries/Hydrology
Class III HC5 adjacent to tip of east unit boundary: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Silvicultural Prescription
Use single-tree selection to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

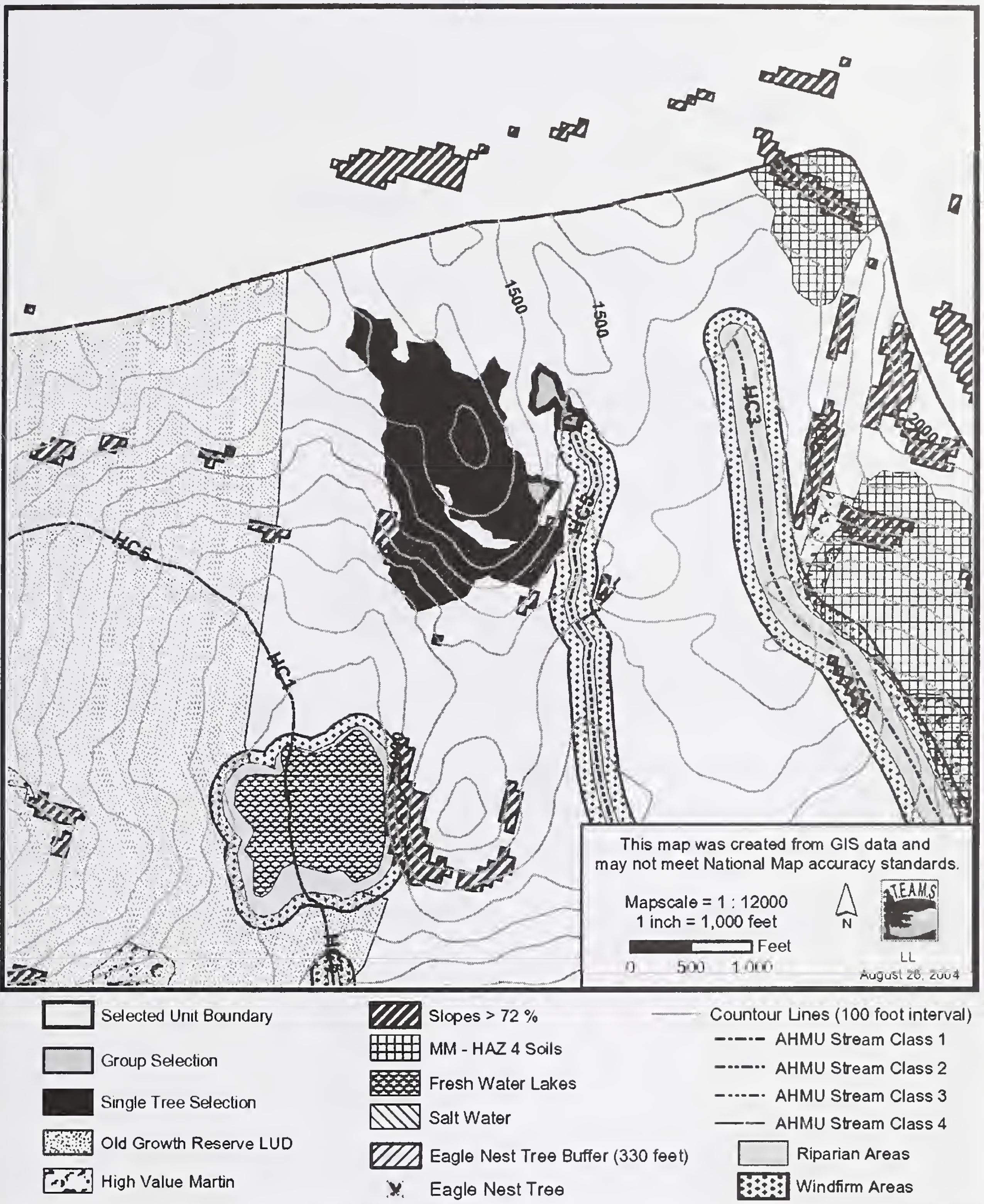
Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

B. All hemlock 0-14 inches dbh and over 40 inches dbh.

Logging System and Unit Design
Helicopter yard to road.

Tongass
National Forest

Emerald Bay Project Area
Unit Card -- Alternative C
7210-5



Emerald Bay Project Alternative C Unit Card

Unit 5

Harvest Acres: 50 MBF Volume: 645 CCF Volume: 1290
Aerial Photo: 1973 Flight #: 29 Photo #: 32

Resource Concerns and Mitigation

Wildlife

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
All of Unit 5 is mapped as a complex of Forested Wetlands and Forested Uplands. The Forested Wetlands are on mineral soils on moderately to steeply sloping ground. Partial suspension is required. Unit 5 is planned for helicopter yarding with full suspension, which will meet resource objectives outlined in BMP 12.5 and 13.9.

Landslide Prone Soils
There is approximately 1 acre of slopes greater than 72 percent gradient in Unit 5. The pitch is very short and landslide potential appears to be low (BMP 13.5). A minimum of partial suspension is required, and full suspension is planned via helicopter yarding (BMP 13.9).

Fisheries/Hydrology
Class III HC5 adjacent to tip of east unit boundary: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

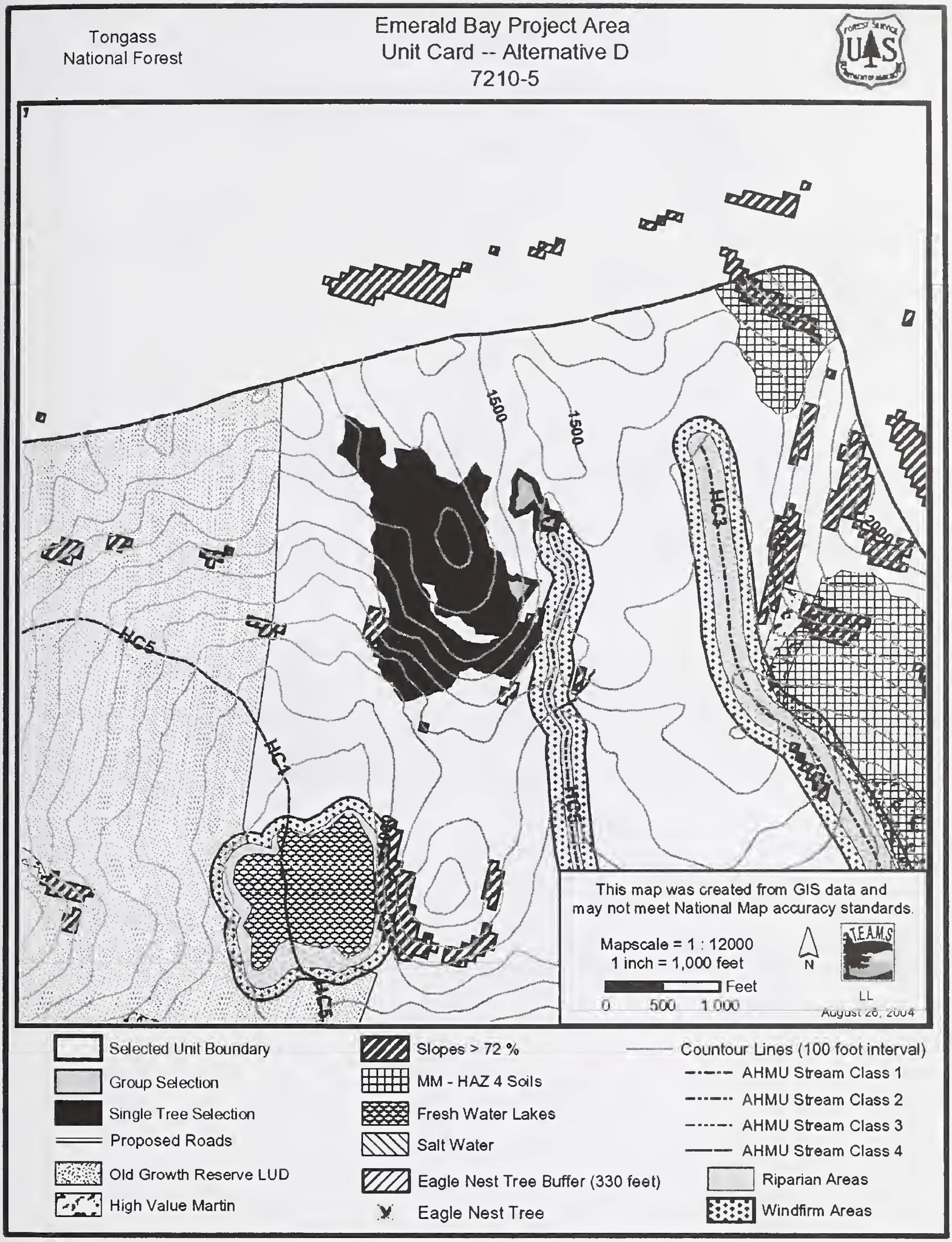
Silvicultural Prescription (Single-tree & Group Selection
Use single-tree selection to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

B. All hemlock 0-14 inches dbh and over 40 inches dbh.

Harvest 3 acres using group selection removing all merchantable trees from areas ranging from 1/4 to 2 acres in size. Leave at least 200 feet between groups.

Logging System and Unit Design
Helicopter harvest to a barge in Emerald Bay.


Tongass
National Forest
Emerald Bay Project Area
Unit Card -- Alternative D
7210-5
1500
1500
HC3
HC5
HC4
HC3
2000
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Mapscale = 1 : 12000
1 inch = 1,000 feet
N
Feet
0 500 1,000
LL
August 26, 2004
Selected Unit Boundary
Group Selection
Single Tree Selection
Proposed Roads
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Area Alternative D Unit Card

Unit 5

Harvest Acres:	50	MBF Volume:	842	CCF Volume:	1,792
Aerial Photo:	1973	Flight #:	29	Photo #:	32

Resource Concerns and Mitigation

Wildlife

Scenery
No impacts to visual quality are anticipated.

Wetlands
The entire unit is mapped as a complex of Forested Wetlands and Forested Uplands. The Forested Wetlands are on mineral soils on moderately to steeply sloping ground. Helicopter yarding in conjunction with single-tree selection prescription will provide protection to the wetland resources (BMP 12.5 and 13.9). (F11)

Soils
There is approximately 1 acre of slopes greater than 72 percent gradient within unit. The pitch is very short and landslide potential appears to be low (BMP 13.5). Helicopter yarding in conjunction with single-tree selection prescription will meet resource objectives (BMP 13.9). (F18)

Fisheries/Hydrology
Class III HC5 adjacent to tip of east unit boundary: no timber harvest within the V-notch. (F1, F2)

Silvicultural Prescription (Single-tree and Group Selection)
Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system. Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:

Single-tree Selection (47 acres)

Use single-tree selection to remove all trees as described below:

A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

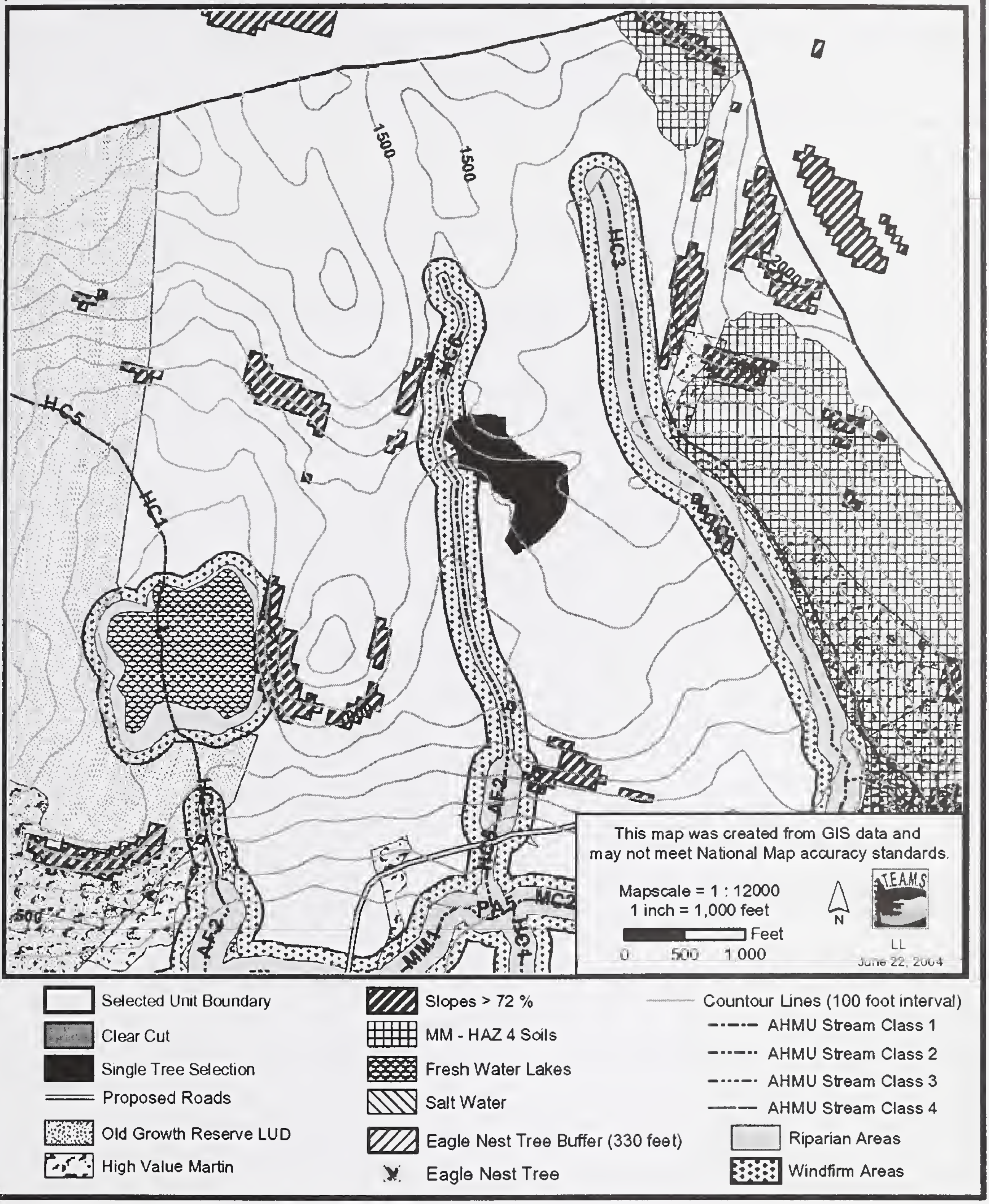
Group Selection will be applied to two areas (3 acres).

Target basal area will be removed in groups, the resulting opening not to exceed 2 acres in size.

Logging System and Unit Design
Helicopter harvest to road.

Tongass
National Forest

Emerald Bay Project Area
Unit Card – Alternative B
7210-6



Emerald Bay Project Alternative B Unit Card

Unit 6

Harvest Acres: 10 MBF Volume: 200 CCF Volume: 400
Aerial Photo: 1973 Flight #: 29 Photo #: 32

Resource Concerns and Mitigation

Wildlife

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

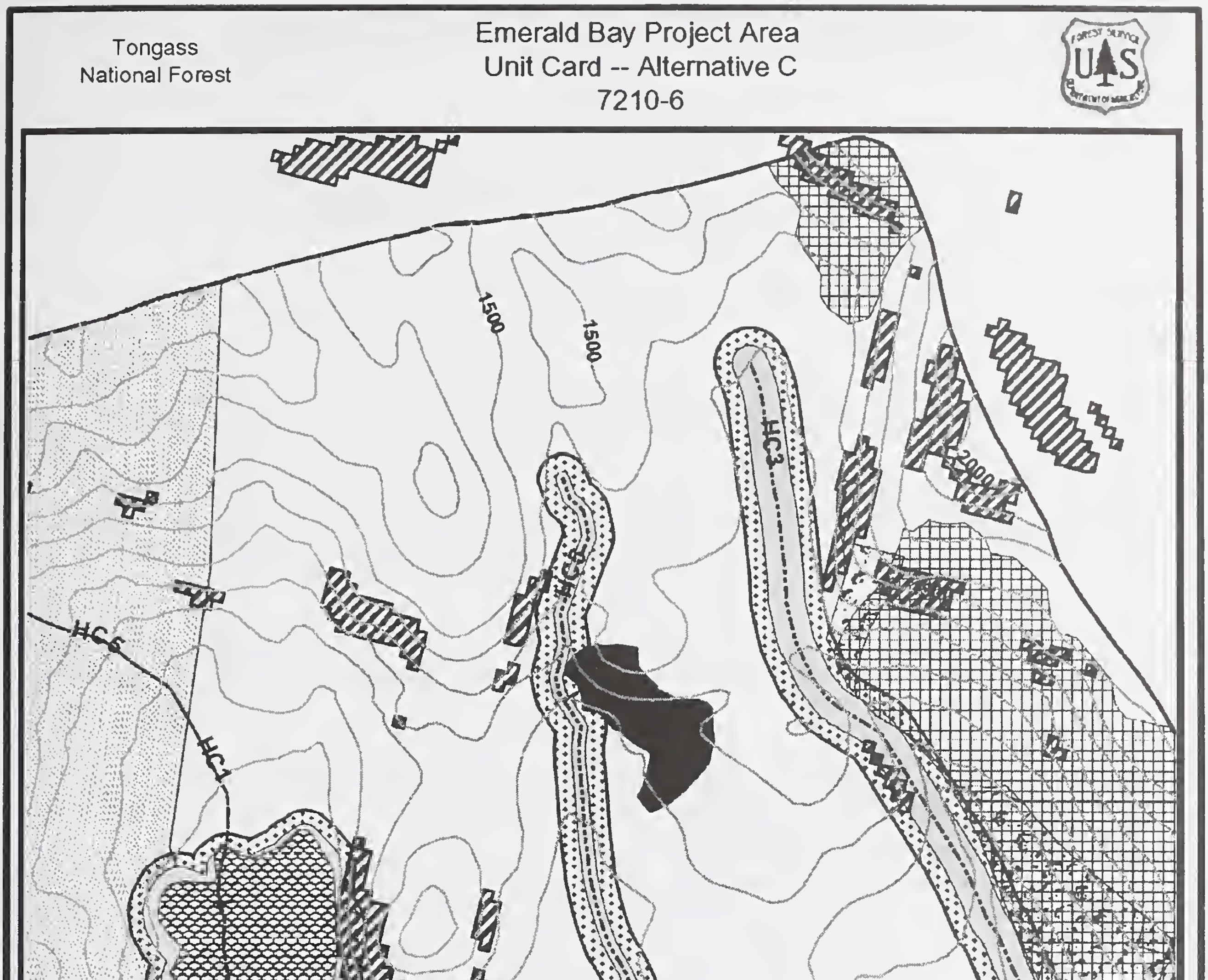
Wetlands
The entire unit is mapped as Forested Wetland, cedar-hemlock-blueberry plant association. Full suspension via helicopter yarding will provide a low-impact yarding method per BMP 12.5.

Landslide Prone Soils
There are perhaps 2 acres of slopes greater than 72 percent in the unit associated with a small cliff. The soils in the unit have a low to moderate mass movement index (BMP 13.5). A minimum of partial suspension is required. Full suspension via helicopter yarding will be achieved (BMP 13.9).

Fisheries/Hydrology
Class III HC5 adjacent to west unit boundary: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Silvicultural Prescription
Single-tree selection

Logging System and Unit Design
Helicopter yard to road.


Tongass National Forest
Emerald Bay Project Area
Unit Card -- Alternative C
7210-6
1500
1500
2000
HC3
HC8
HC5
HC1
AE2
HC6
PA5
This map was created from GIS data and may not meet National Map accuracy standards.
Mapscale = 1 : 12000
1 inch = 1,000 feet
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0 500 1,000
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T.E.A.M.S
LL
August 26, 2004
Selected Unit Boundary
Group Selection
Single Tree Selection
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative C Unit Card

Unit 6

Harvest Acres:	10	MBF Volume:	118	CCF Volume:	236
Aerial Photo:	1973	Flight #:	29	Photo #:	32

Resource Concerns and Mitigation

Wildlife

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
The entire unit is mapped as Forested Wetland, cedar-hemlock-blueberry plant association. A minimum of partial suspension is required. Full suspension via helicopter yarding will provide a low-impact yarding method per BMP 12.5 and 13. Single-tree selection harvest of 50 percent of the trees will provide additional wetland protection.

Landslide Prone Soils
There are perhaps 2 acres of slopes greater than 72 percent in the unit associated with a small cliff. The soils in the unit have a low to moderate mass movement index. A minimum of partial suspension is required. Full suspension via helicopter yarding will be achieved (BMP 13.9).

Fisheries
Class III HC5 adjacent to west unit boundary: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Silvicultural Prescription (Single-tree Selection)
Use single-tree selection to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

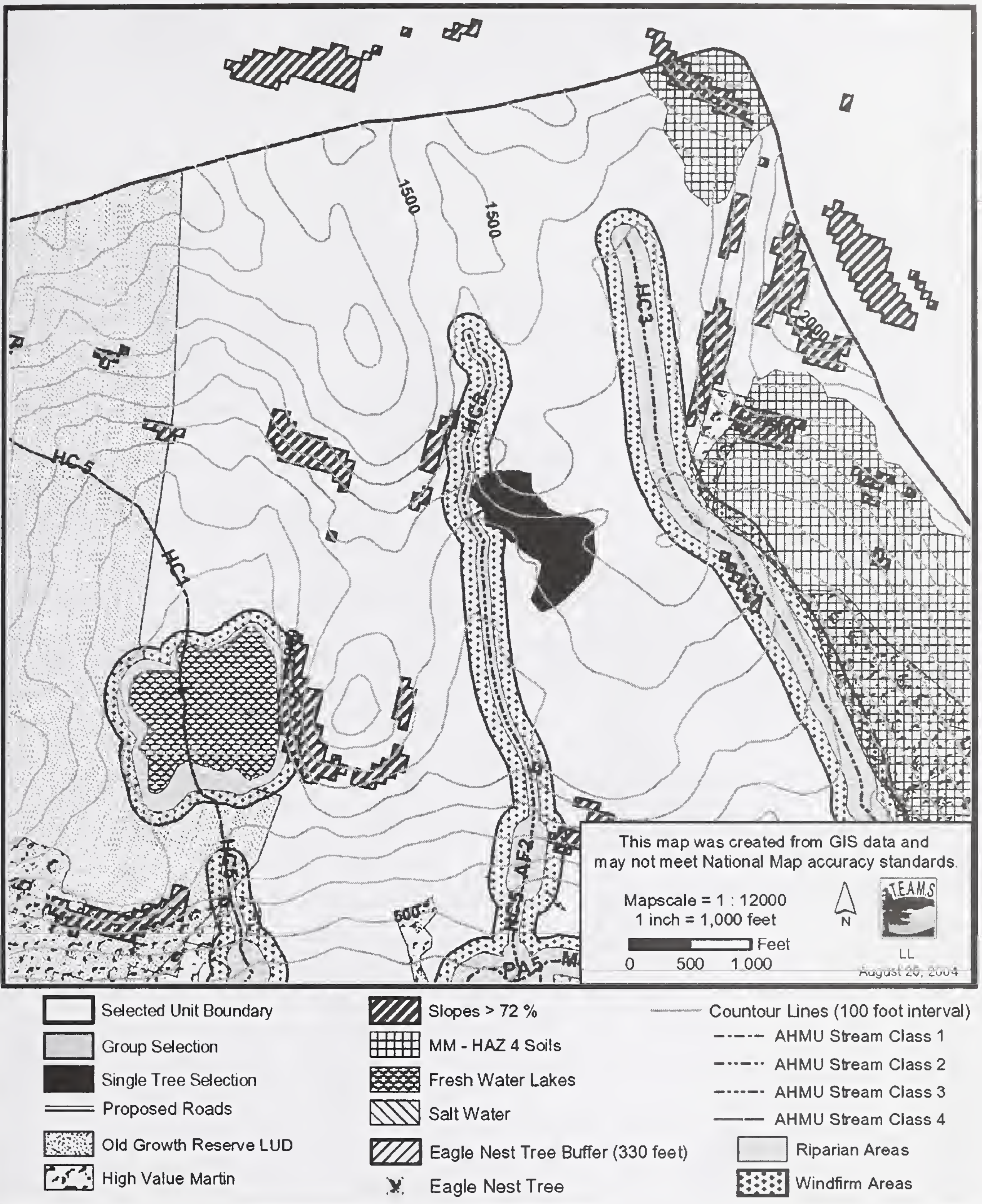
Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

B. All hemlock 0-14 inches dbh and over 40 inches dbh.

Logging System and Unit Design
Helicopter harvest to a barge in Emerald Bay.

Tongass National Forest

Emerald Bay Project Area
Unit Card -- Alternative D
7210-6



Emerald Bay Project Alternative D Unit Card

Unit 6

Harvest Acres:	10	MBF Volume:	197	CCF Volume:	419
Aerial Photo:	1973	Flight #:	29	Photo #:	32

Resource Concerns and Mitigation

Wildlife

Scenery
No impacts to visual quality are anticipated.

Wetlands
The entire unit is mapped as Forested Wetland, cedar-hemlock-blueberry plant association. Helicopter yarding in conjunction with single-tree selection prescription will provide protection to the wetland resources (BMPs 12.5, 13.9). (F11)

Soils
There are 2 acres of slopes greater than 72 percent in the unit associated with a small cliff. The soils in the unit have a low to moderate mass movement index. Helicopter yarding in conjunction with single-tree selection prescription will provide adequate resource protection (BMP 13.9). (F18)

Fisheries/Hydrology
Class III HC5 adjacent to west unit boundary: no timber harvest within the V-notch. (F1, F2)
Class IV HC5 is within the northern portion of the unit. Sale administrator should assess need for directional felling during harvest. (F3)

Silvicultural Prescription (Single-tree Selection)
Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system.

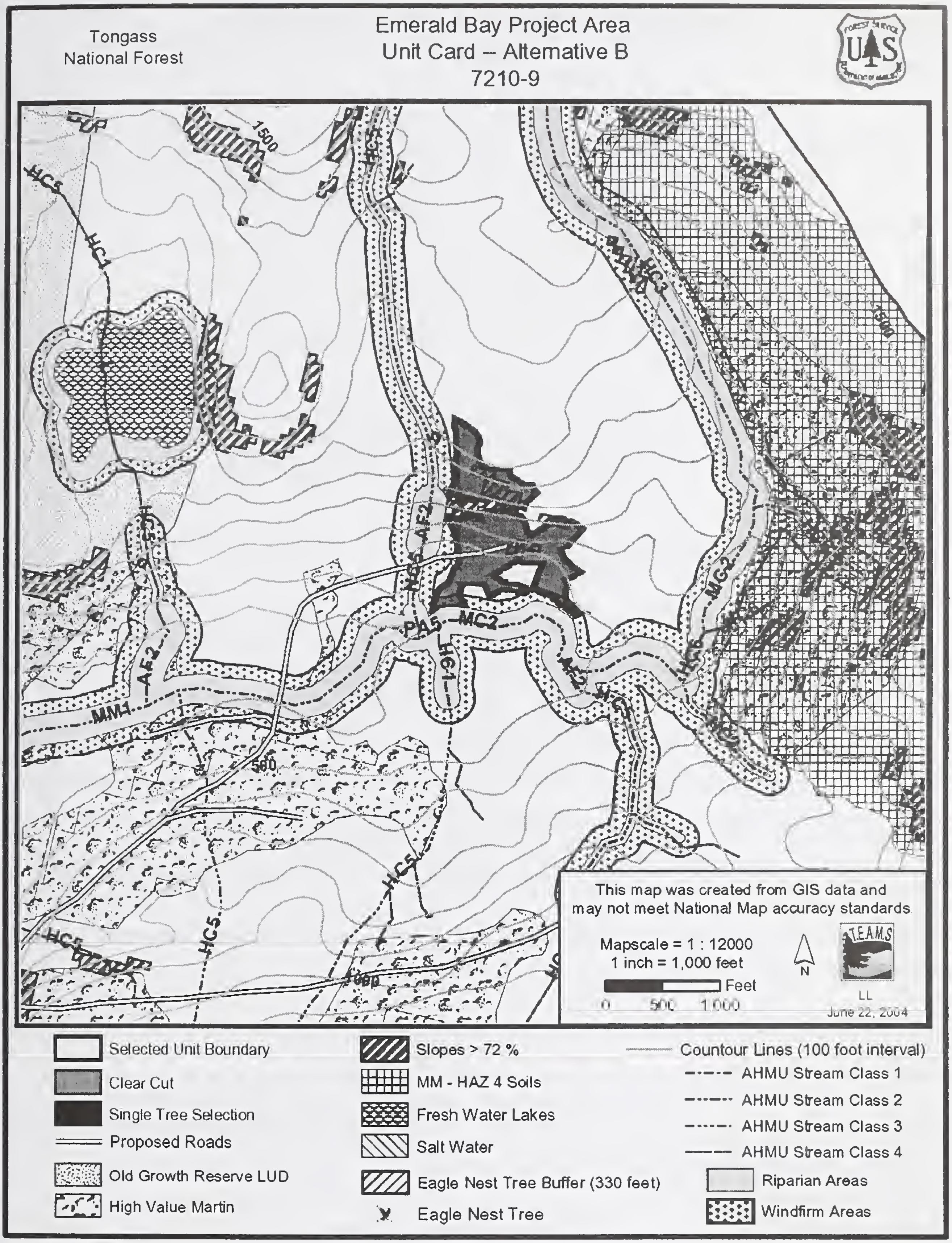
Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:

Single-tree selection (10 acres)

Use single-tree selection to remove all trees as described below:

A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

Logging System and Unit Design
Helicopter harvest to road.


Tongass
National Forest
Emerald Bay Project Area
Unit Card – Alternative B
7210-9
This map was created from GIS data and may not meet National Map accuracy standards.
Mapscale = 1 : 12000
1 inch = 1,000 feet
Feet
0 500 1,000
N
LL
June 22, 2004
HC5
HC1
AF2
MM1
PA5
MC2
HG1
MC2
HC3
500
1500
Selected Unit Boundary
Clear Cut
Single Tree Selection
Proposed Roads
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative B Unit Card

Unit 9

Harvest Acres:	20	MBF Volume:	740	CCF Volume:	1480
Aerial Photo:	1973	Flight #:	29	Photo #:	32

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 0.02 acres of high value marten habitat to be clearcut. (W28)

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
Nearly the entire unit is mapped as a Forested Wetland and Forested Wetland and Upland complex. A 1 acre non-forested poor fen (muskeg) lies in the southwest corner of the unit adjacent to the stream buffer on the west side of the unit. The muskeg could be included in the stream buffer (BMP 12.5 & 13.16). Partial suspension is required on the remainder of the unit (BMP 13.9).

Landslide Prone Soils
Slopes in Unit 9 range up to 60 percent gradient and no slopes over 72 percent were identified (BMP 13.5). Partial suspension is required to protect wetlands and prevent erosion (BMPs 13.9, 12.5 & 13.14).

Fisheries/Hydrology
Unit 9 is bordered by a water-quality stream to the west and a Class II stream with high-value fish habitat, wetland, and riparian area to the south (BMPs 12.5 & 12.6l). The area south of the unit is fluvial and supports the only tall sedge fen identified on the Project Area. This area will require a windfirm buffer that includes the entire riparian area (BMPs 12.6a & 13.16). The extent of the riparian area needs to be verified during project implementation.

Class III HC5 adjacent to west unit boundary: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class III AF2 adjacent to west boundary: a buffer that is the greater of 140 foot or active portion of alluvial fan is required.

Class II HC1 adjacent to southwest unit corner: no harvest within the greater of 100 feet or the V-notch; manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class II PA5 adjacent to south boundary: greater of 100 foot or RMA buffer required; additional 85 foot select harvest windfirm buffer required.

Class II MC2 adjacent to south boundary: no harvest within the greater of 100 feet or the channel sideslope break required.

Silvicultural Prescription
Clearcut

Clearcut is the optimum method of harvest where prescribed: Lands proposed for clearcut are in the Timber Production LUD where a management goal is to maintain and promote industrial wood production (USDA FS 2001). Clearcutting is a recommended harvest where timber production is the primary purpose because logging costs are lower than with other systems; site exposure to the sun raises soil temperature, which speeds decomposition or mor, thereby improving site productivity; clearcutting favors the regeneration of Sitka spruce, a desireable timber species; the thin bark and shallow roots of hemlock and spruce make them susceptible to logging injury, which leads to decay, especially in hemlock, and clearcutting minimizes this damage and volume loss (Burns, R. 1983).

Logging System and Unit Design
Cable yard running skyline.

Tongass
National Forest

Emerald Bay Project Area
Unit Card -- Alternative C
7210-9

- Selected Unit Boundary
- Group Selection
- Single Tree Selection
- Old Growth Reserve LUD
- High Value Martin
- Slopes > 72 %
- MM - HAZ 4 Soils
- Fresh Water Lakes
- Salt Water
- Eagle Nest Tree Buffer (330 feet)
- Eagle Nest Tree
- Countour Lines (100 foot interval)
- AHMU Stream Class 1
- AHMU Stream Class 2
- AHMU Stream Class 3
- AHMU Stream Class 4
- Riparian Areas
- Windfirm Areas

Emerald Bay Project Alternative C Unit Card

Unit 9

Harvest Acres:	20	MBF Volume:	432	CCF Volume:	864
Aerial Photo:	1973	Flight #:	29	Photo #:	32

Resource Concerns and Mitigation

Wildlife

This unit unit incudes 0.02 acres of high value marten habitat to be treated with single-tree selection.

Scenery

This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands

Nearly the entire unit is mapped as a Forested Wetland and Forested Wetland and Upland complex. A 1 acre non-forested poor fen (muskeg) lies in the southwest corner of the unit adjacent to the stream buffer on the west side of the unit. The muskeg could be included in the stream buffer (BMP 12.5 & 13.16). Partial suspension is required on the remainder of the unit (BMP 13.9). Full suspension will be achieved via helicopter yarding and and single-tree selection will provide additional resource protection.

Landslide Prone Soils

Slopes in Unit 9 range up to 60 percent gradient and no slopes over 72 percent were identified (BMP 13.5). Partial suspension is required to protect wetlands and prevent erosion (BMPs 13.9, 12.5 & 13.14). Full suspension and individual tree mark leaving 50 percent of the trees will further protect soil resources.

Fisheries

Unit 9 is bordered by a water-quality stream to the west and a Class II stream with high-value fish habitat, wetland, and riparian area to the south (BMPs 12.5 & 12.6l). The area south of the unit is fluvial and supports the only tall sedge fen identified on the Project Area. This area will require a windfirm buffer that includes the entire riparian area (BMPs 12.6a & 13.16). The extent of the riparian area needs to be verified during project implementation.

Class III HC5 adjacent to west unit boundary: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class III AF2 adjacent to west boundary: a buffer that is the greater of 140 foot or active portion of alluvial fan is required.

Class II HC1 adjacent to southwest unit corner: no harvest within the greater of 100 feet or the V-notch; manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness

Class II PA5 adjacent to south boundary: greater of 100 foot or RMA buffer required; additional 85 foot select harvest windfirm buffer required

Class II MC2 adjacent to south boundary: no harvest within the greater of 100 feet or the channel sideslope break required.

Silvicultural Prescription (Single-tree Selection and Group Selection)

Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system. Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:

Single-tree Selection (13 acres)

Use single-tree selection to remove all trees as described below:

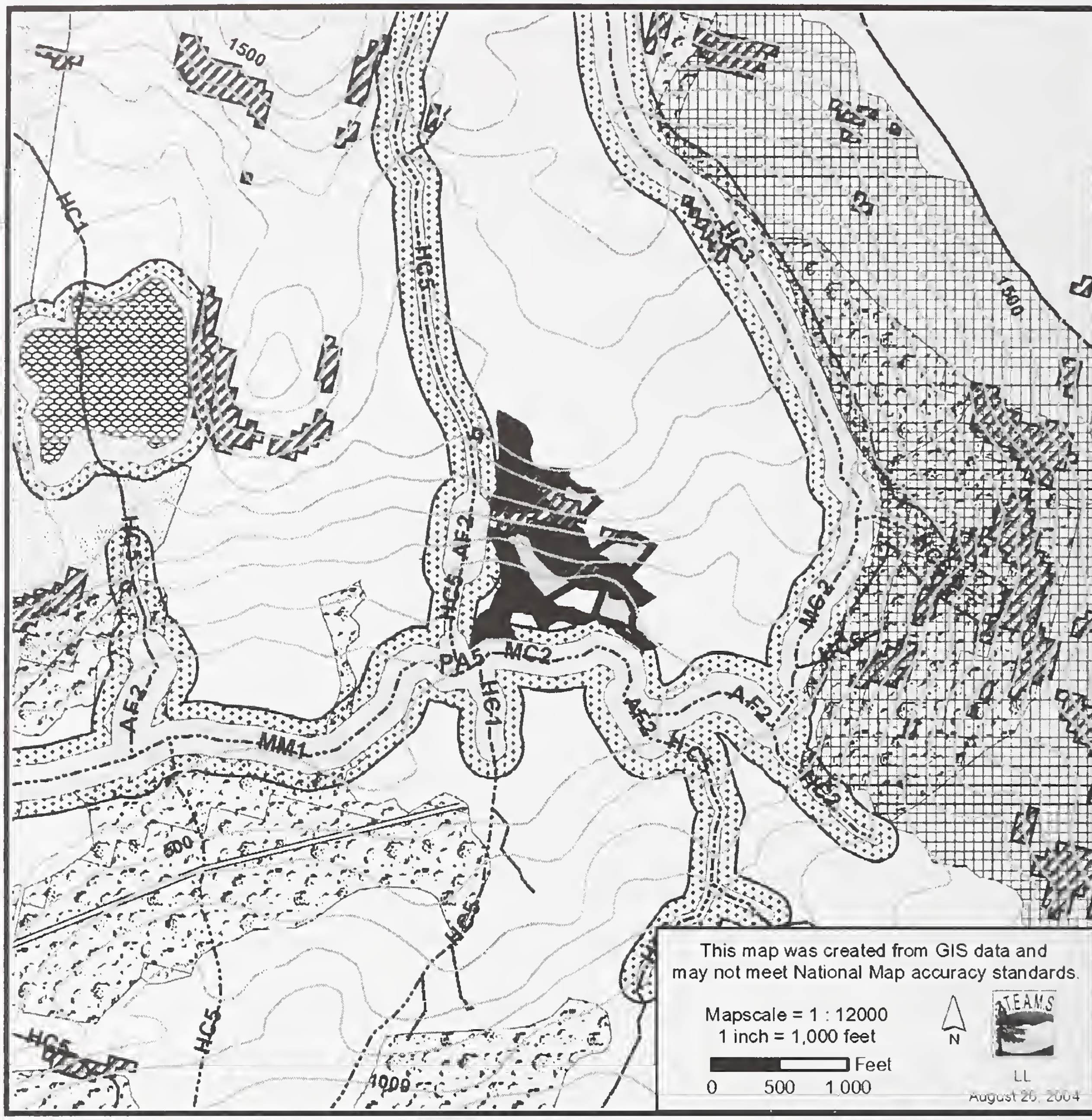
A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

Group Selection will be applied to four areas (7 acres).
Target basal area will be removed in groups, the resulting openings not to exceed 2 acres in size.

Logging System and Unit Design
Helicopter harvest to a barge in Emerald Bay.

Tongass
National Forest

Emerald Bay Project Area
Unit Card -- Alternative D
7210-9



Selected Unit Boundary
Group Selection
Single Tree Selection
Proposed Roads
Old Growth Reserve LUD
High Value Martin

Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree

Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative D Unit Card

Unit 9

Harvest Acres:	20	MBF Volume:	358	CCF Volume:	762
Aerial Photo:	1973	Flight #:	29	Photo #:	32

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 0.02 acres of high value marten habitat to be treated with single-tree selection. (W28)

Scenery
No impacts to visual quality are anticipated.

Wetlands
Nearly the entire unit is mapped as a Forested Wetland and Forested Wetland and Upland complex. A 1-acre non-forested poor fen (muskeg) lies in the southwest corner of the unit adjacent to the stream buffer on the west side of the unit. The muskeg is not scheduled for harvest and provides additional windfirmness adjacent to the stream buffer (BMP 12.5 and 13.16). Helicopter yarding in conjunction with single-tree selection prescription will provide adequate resource protection (BMP 13.9). (F11)

Soils
Slopes within unit range up to 60 percent gradient and no slopes over 72 percent were identified (BMP 13.5). Helicopter yarding in conjunction with single-tree selection prescription will adequately protect soil resources (BMPs 13.9, 12.5 and 13.14). (F18)

Fisheries/Hydrology
Unit is bordered by a water-quality stream to the west and a Class II stream with high-value fish habitat, wetland, and riparian area to the south (BMPs 12.5 and 12.61). This area will require a windfirm buffer that includes the entire riparian area (BMPs 12.6a and 13.16). The extent of the riparian area needs to be verified during project implementation.

Class II AF2 adjacent to west boundary: a buffer that is the greater of 140 foot or active portion of alluvial fan is required. (F1, F2)
Class II HC1 adjacent to southwest unit corner: no harvest within the greater of 100 feet or the V-notch. (F1, F2)
Class III HC5 adjacent to west unit boundary: no timber harvest within the V-notch. (F1, F2)
Class II PA5 adjacent to south boundary: greater of 100 foot or RMA buffer required. (F1, F2)

Silvicultural Prescription (Single-tree and Group Selection)
Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system.

Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:

Single-tree Selection (13 acres)

Use single-tree selection to remove all trees as described below:

A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

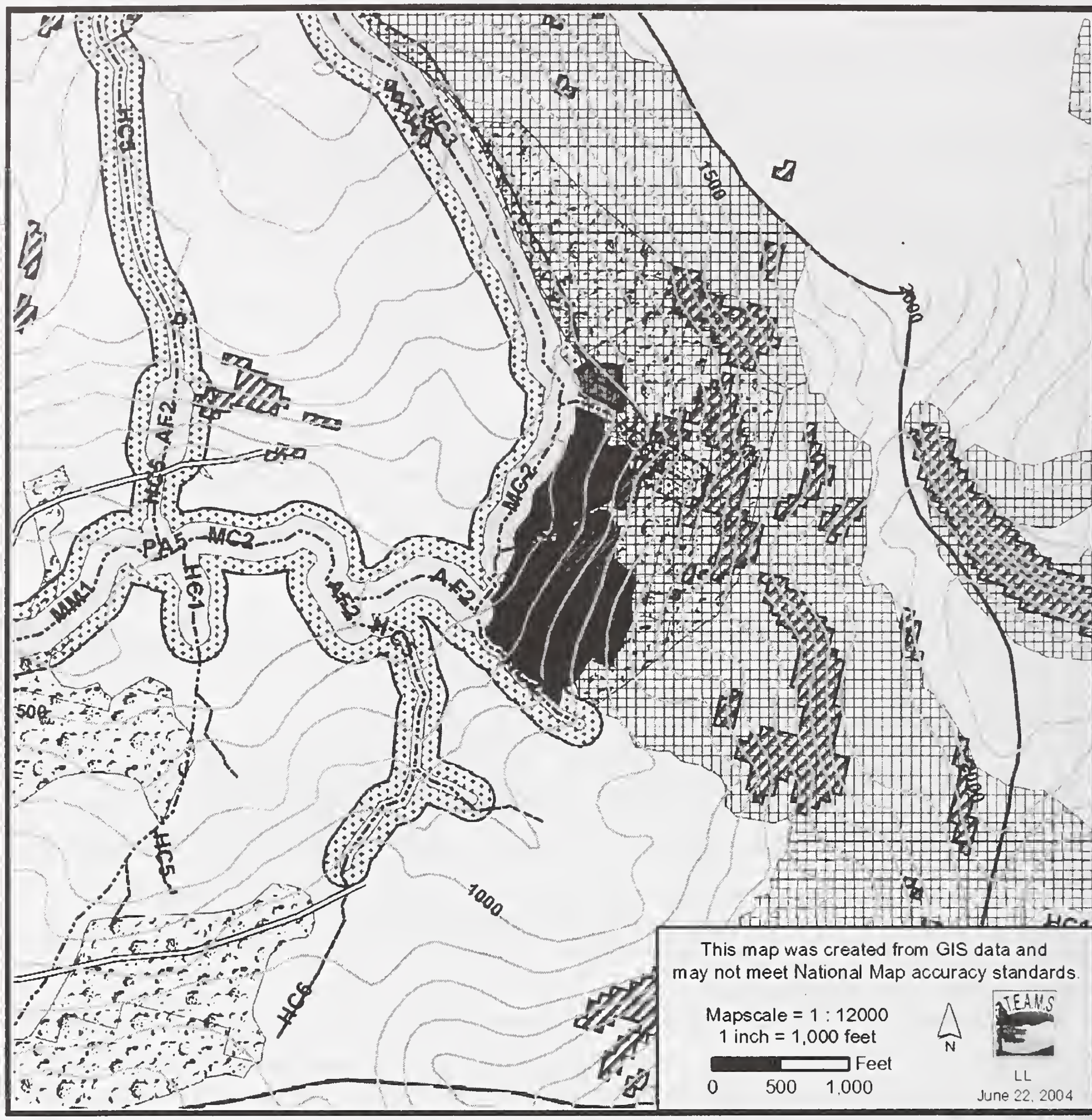
Group Selection will be applied to four areas (7 acres).

Target basal area will be removed in groups, the resulting openings not to exceed 2 acres in size.

Logging System and Unit Design
Helicopter harvest to road.

Tongass
National Forest

Emerald Bay Project Area
Unit Card – Alternative B
7210-10



Selected Unit Boundary	Slopes > 72 %	Countour Lines (100 foot interval)
Clear Cut	MM - HAZ 4 Soils	AHMU Stream Class 1
Single Tree Selection	Fresh Water Lakes	AHMU Stream Class 2
Proposed Roads	Salt Water	AHMU Stream Class 3
Old Growth Reserve LUD	Eagle Nest Tree Buffer (330 feet)	AHMU Stream Class 4
High Value Martin	Eagle Nest Tree	Riparian Areas
		Windfirm Areas

Emerald Bay Project Alternative B Unit Card

Unit 10

Harvest Acres: 30 MBF Volume: 709 CCF Volume: 1418
Aerial Photo: 1973 Flight #: 29 Photo #: 32

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 26 acres of high value marten habitat; 2 acres to be clearcut and 24 acres of single-tree selection. Marten guidelines to apply in clearcut openings over 2 acres: maintain 10-20 percent of original stand structure, average 4 large trees/acre (20-30"+), average 3 snags per acre, average 3 pieces downed logs/acre (20-30"+). (W28)

An occupied red-tailed hawk nest was found in the northern portion of Unit 10. Applicable standards and guidelines (600 foot windfirm buffer) will be applied as long as the nest remains occupied. Occupancy surveys will be conducted annually.

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
The south end of Unit 10b is mapped as Forested Wetland. The remainder of the unit is mapped as Forested Upland and Forested Wetland complex. Field verification indicates that the unit is mostly uplands. Partial suspension is required to protect wetlands (BMP 12.5). Full suspension is planned via helicopter yarding (BMP 13.9).

Landslide Prone Soils
Slopes in Unit 10a and 10b are less than 60 percent gradient. No slopes over 72 percent were identified. The mass movement rating ranges from low to high in Unit 10b and low in Unit 10a. A minimum of partial suspension is required to prevent erosion (BMP 13.9 and 13.14). Full suspension is planned via helicopter yarding. Unit 10 is also planned for a selective harvest which will further minimize erosion.

Fisheries/Hydrology
The western boundary of Unit 10a is next to the mainstem. Unit 10b lies between the mainstem and a Class III tributary. A smaller Class III stream flows through the northwest corner of Unit 10b.

Class II HC3 adjacent to west Unit 10a boundary: no harvest within the greater of 100 feet or the V-notch; manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness

Class II MC2 adjacent to west Unit 10a boundary: no harvest within the greater of 100 feet or the channel sideslope break required; manage a reasonable distance (site potential tree height is 100 feet) beyond the slopebreak for windfirmness.

Class II MC2 adjacent to northwest Unit 10b boundary: no harvest within the greater of 100 feet or the channel sideslope break required; manage a reasonable distance (site potential tree height is 100 feet) beyond the slopebreak for windfirmness.

Class III HC6 adjacent to south Unit 10b boundary: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class III HC6 transects northwest corner of Unit 10b: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Follow BMPs 12.6, 12.6a and 13.16.

Silvicultural Prescription
Unit 10a: Clearcut and clearcut with reserves

Clearcut is the optimum method of harvest where prescribed: Lands proposed for clearcut are in the Timber Production LUD where a management goal is to maintain and promote industrial wood production (USDA FS 2001). Clearcutting is a recommended harvest where timber production is the primary purpose because logging costs are lower than with other systems; site exposure to the sun raises soil temperature, which speeds decomposition or mor, thereby improving site productivity; clearcutting favors the regeneration of Sitka spruce, a desireable timber species; the thin bark and shallow roots

of hemlock and spruce make them susceptible to logging injury, which leads to decay, especially in hemlock, and clearcutting minimizes this damage and volume loss (Burns, R. 1983).

Unit 10b: Use single-tree selection to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

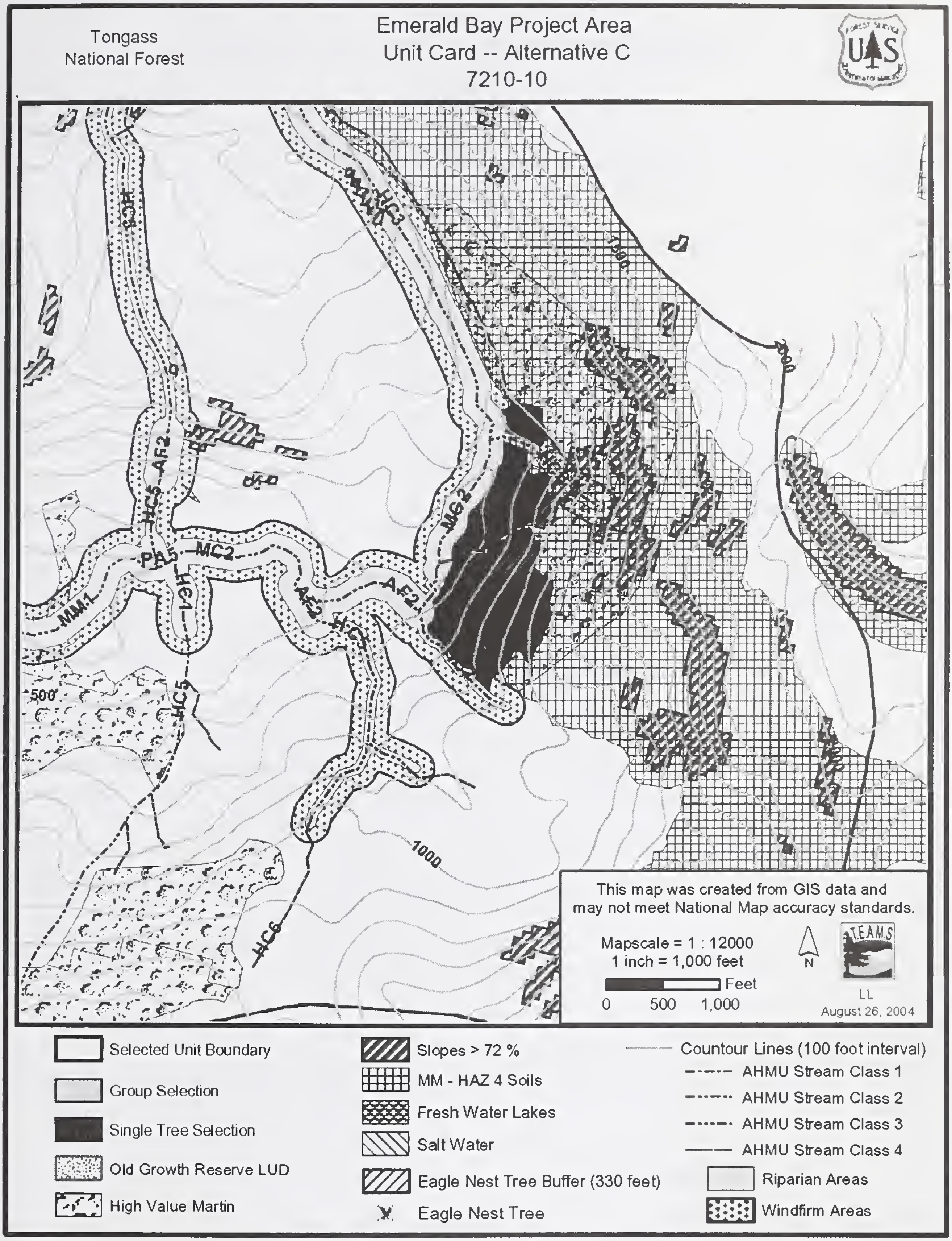
Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

B. All hemlock 0-14 inches dbh and over 40 inches dbh.

Logging System and Unit Design

Helicopter yard to road.

Transportation



Tongass
National Forest
Emerald Bay Project Area
Unit Card -- Alternative C
7210-10
HC5
HC3
AF2
HC5
PA5
MC2
MM1
HC1
HC5
AF2
HC5
AF2
MC2
HC6
500
1000
This map was created from GIS data and may not meet National Map accuracy standards.
Mapscale = 1 : 12000
1 inch = 1,000 feet
Feet
0 500 1,000
N
TEAMS
LL
August 26, 2004
Selected Unit Boundary
Group Selection
Single Tree Selection
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative C Unit Card

Unit 10

Harvest Acres:	30	MBF Volume:	495	CCF Volume:	990
Aerial Photo:	1973	Flight #:	29	Photo #:	32

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 26 acres of high value marten habitat to be treated with single-tree selection. (W28)

An occupied red-tailed hawk nest was found in the northern portion of Unit 10. Applicable standards and guidelines (600 foot windfirm buffer) will be applied as long as the nest remains occupied. Occupancy surveys will be conducted annually.

Wetlands
The south end of Unit 10b is mapped as Forested Wetland. The remainder of the unit is mapped as Forested Upland and Forested Wetland complex. Field verification indicates that the unit is mostly uplands. Partial suspension is required to protect wetlands (BMP 12.5). Full suspension is planned via helicopter yarding (BMP 13.9).

Landslide Prone Soils
Slopes in Unit 10a and 10b are less than 60 percent gradient. No slopes over 72 percent were identified. The mass movement rating ranges from low to high in Unit 10b and low in Unit 10a. A minimum of partial suspension is required to prevent erosion (BMP 13.9 and 13.14). Full suspension is planned via helicopter yarding. Unit 10 is also planned for a selective harvest which will further minimize erosion.

Fisheries
The western boundary of Unit 10a is next to the mainstem. Unit 10b lies between the mainstem and a Class III tributary. A smaller Class III stream flows through the northwest corner of Unit 10b.

Class II HC3 adjacent to west Unit 10a boundary: no harvest within the greater of 100 feet or the V-notch; manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class II MC2 adjacent to west Unit 10a boundary: no harvest within the greater of 100 feet or the channel sideslope break required; manage a reasonable distance (site potential tree height is 100 feet) beyond the slopebreak for windfirmness.

Class II MC2 adjacent to northwest Unit 10b boundary: no harvest within the greater of 100 feet or the channel sideslope break required; manage a reasonable distance (site potential tree height is 100 feet) beyond the slopebreak for windfirmness.

Class III HC6 adjacent to south Unit 10b boundary: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class III HC6 transects northwest corner of Unit 10b: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Follow BMPs 12.6, 12.6a and 13.16.

Silvicultural Prescription (Single-tree Selection)
Use single-tree selection to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

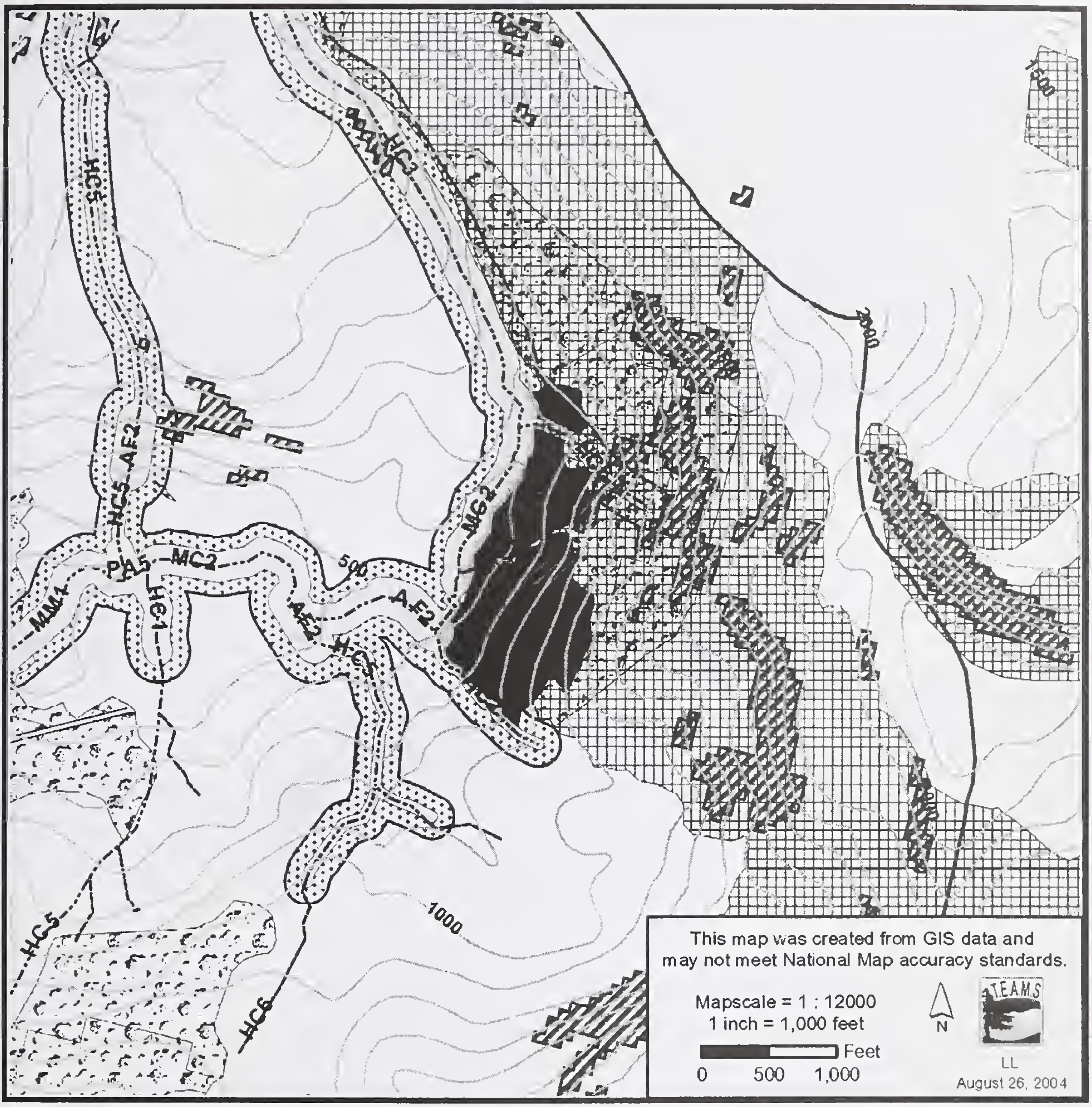
Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

B. All Hemlock 0-14 inches dbh and over 40 inches dbh.

Logging System and Unit Design
Helicopter harvest to a barge in Emerald Bay.

Tongass
National Forest

Emerald Bay Project Area
Unit Card -- Alternative D
7210-10



Selected Unit Boundary
Group Selection
Single Tree Selection
Proposed Roads
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Area Alternative D Unit Card

Unit 10

Harvest Acres:	30	MBF Volume:	591	CCF Volume:	1,258
Aerial Photo:	1973	Flight #:	29	Photo #:	32

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 26 acres of high value marten habitat to be treated with single-tree selection. (W28)

An occupied red-tailed hawk nest was found in the northern portion of Unit 10. Applicable standards and guidelines (600 foot windfirm buffer) will be applied as long as the nest remains occupied. Occupancy surveys will be conducted annually.

Scenery
No impacts to visual quality are anticipated.

Wetlands
The south end of Unit 10b is mapped as Forested Wetland. The remainder of the unit is mapped as Forested Upland and Forested Wetland complex. Field verification indicates that the unit is mostly uplands. Helicopter yarding will meet resource objectives (BMP 12.5 and 13.9). (F11)

Soils
Unit 10 lies on a footslope colluvial area, and soils are mostly well drained. Small areas of slopes over 72 percent totaling about one acre (in Units 10b and 10c) were identified. These areas were also identified as having a very high landslide potential. In Unit 10c two small areas of very high landslide potential were identified and remained in the unit given that helicopter yarding along with single-tree selection prescription are planned throughout the unit. Therefore resource objectives will be met (BMP 13.9 and 13.14). (F15, F18)

Fisheries/Hydrology
The western boundary of Unit 10a, 10b, and 10c is next to the mainstem of Birch Creek.
Class II HC3 adjacent to west Unit 10a, 10b, and 10c boundary: no harvest within the greater of 100 feet or the V-notch. (F1, F2)
Class III HC5 stream between 10a and 10b. Slope break buffer required. (F1, F2)
Class III HC5 between Units 10b and 10c. Slope break buffer required. (F1, F2)
Class III HC5 south of Unit 10c. Slope break buffer required. (F1, F2)
Follow BMPs 12.6, 12.6a and 13.16.

Silvicultural Prescription (Single-tree Selection)
Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system.

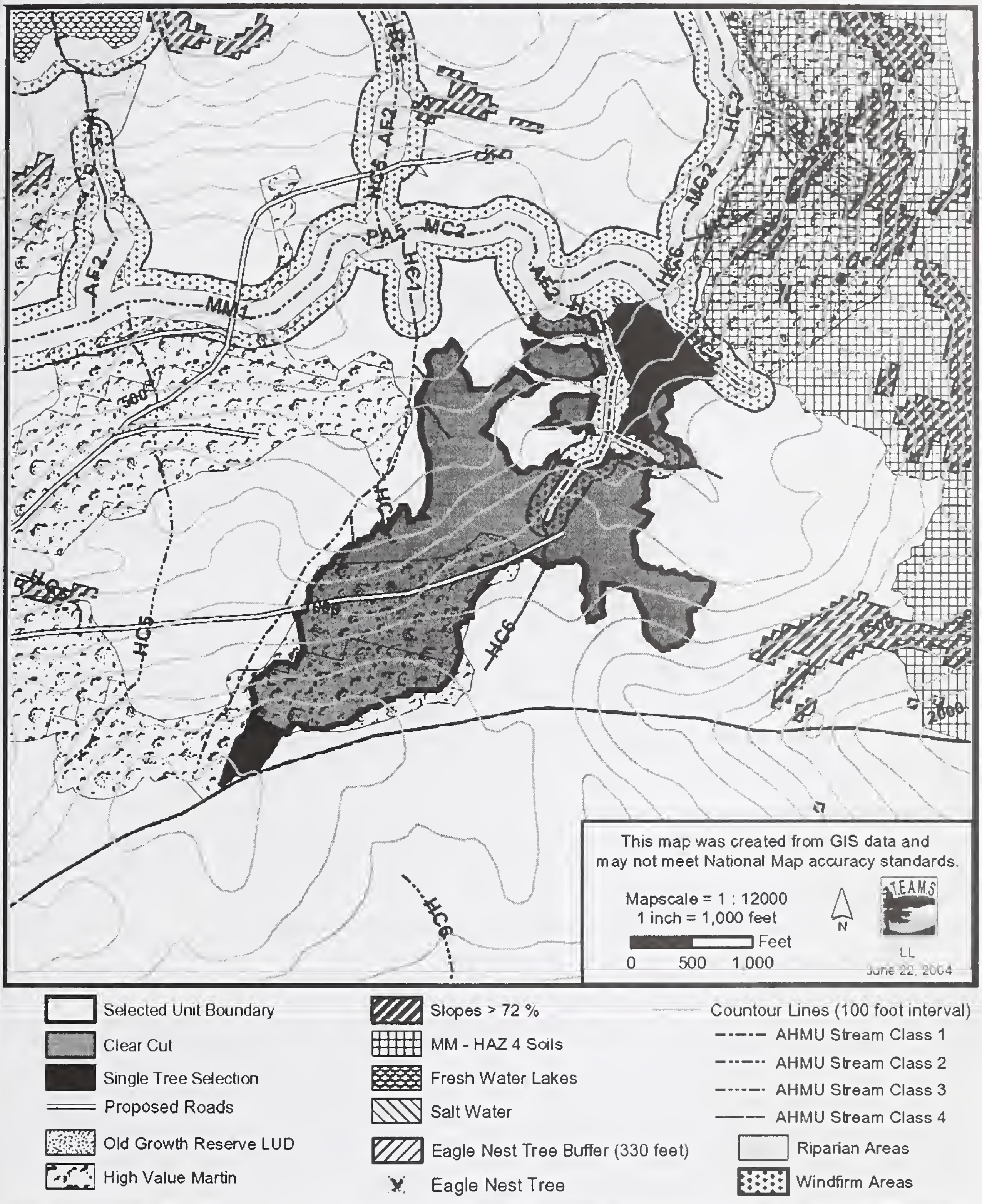
Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:

Single-tree Selection (33 acres)
Use single-tree selection to remove all trees as described below:
A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

Logging System and Unit Design
Helicopter harvest to road.

Tongass National Forest

Emerald Bay Project Area
Unit Card – Alternative B
7210-11



Emerald Bay Project Alternative B Unit Card

Unit 11

Harvest Acres: 119 MBF Volume: 2200 CCF Volume: 4400
Aerial Photo: 1973 Flight #: 29 Photo #: 31

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 45 acres of high value marten habitat; 42 acres to be clearcut and 3 acres of single-tree selection. Marten guidelines to apply in clearcut area: maintain 10-20 percent of original stand structure, average 4 large trees/acre (20-30"+), average 3 snags per acre, average 3 pieces downed logs/acre (20-30"+). (W28)

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
There are approximately 30 acres of Forested Wetlands on mineral soils in the east end of Unit 11. Partial suspension is required in this area (BMP 12.5 and 13.9).

Landslide Prone Soils
Slopes are dominantly less than 60 percent gradient in Unit 11 and no slopes over 72 percent were identified. The mass movement index ranges from low to high in the unit and partial suspension is required (BMP 13.9). Soils mapped in the west end of the unit are relatively deep and somewhat erodible. Areas disturbed during logging should be revegetated as soon as possible to prevent erosion (BMP 12.17).

Fisheries/Hydrology
Class III HC6 adjacent to east unit boundary: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class III HC5 flows north through unit: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class IV HC5 adjacent to southwest unit boundary. Directional felling required.

Follow BMPs 12.6, 12.6a and 13.16.

Silvicultural Prescription
Use single-tree selection on 12 acres to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

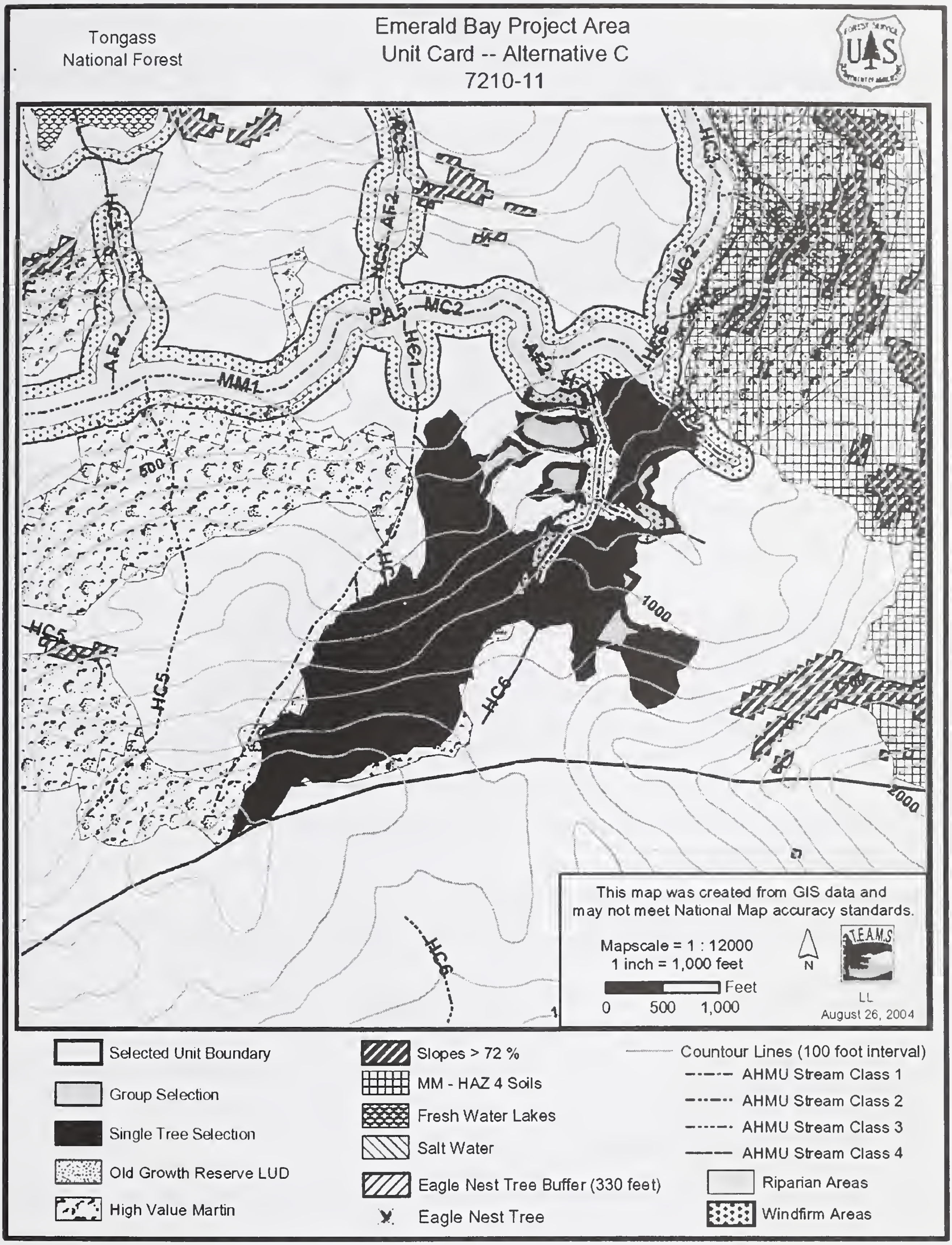
B. All hemlock 0-14 inches dbh and over 40 inches dbh.

Clearcut and Clearcut with Reserves for the remainder of unit.

Clearcut is the optimum method of harvest where prescribed: Lands proposed for clearcut are in the Timber Production LUD where a management goal is to maintain and promote industrial wood production (USDA FS 2001). Clearcutting is a recommended harvest where timber production is the primary purpose because logging costs are lower than with other systems; site exposure to the sun raises soil temperature, which speeds decomposition of mor, thereby improving site productivity; clearcutting favors the regeneration of Sitka spruce, a desireable timber species; the thin bark and shallow roots of hemlock and spruce make them susceptible to logging injury, which leads to decay, especially in hemlock, and clearcutting minimizes this damage and volume loss (Burns, R. 1983).

Logging System and Unit Design
Helicopter yard 7 acres to road and cable yard remainder of unit.

Transportation



Tongass
National Forest
Emerald Bay Project Area
Unit Card -- Alternative C
7210-11
MM1
MC2
PA5
AF2
HC5
HC1
HC3
MC2
HC6
500
1000
2000
This map was created from GIS data and may not meet National Map accuracy standards.
Mapscale = 1 : 12000
1 inch = 1,000 feet
Feet
0 500 1,000
N
T.E.A.M.S.
LL
August 26, 2004
Selected Unit Boundary
Group Selection
Single Tree Selection
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative C Unit Card

Unit 11

Harvest Acres:	119	MBF Volume:	1720	CCF Volume:	3440
Aerial Photo:	1973	Flight #:	29	Photo #:	31

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 45 acres of high value marten habitat to be treated with single-tree selection. (W28)

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
There are approximately 30 acres of Forested Wetlands on mineral soils in the east end of Unit 11. Partial suspension is required in this area (BMP 12.5 and 13.9)

Landslide Prone Soils
Slopes are dominantly less than 60 percent gradient in Unit 11 and no slopes over 72 percent were identified. The mass movement index ranges from low to high in the unit and partial suspension is required (BMP 13.9). Full suspension is planned and will provide additional resource protection. An individual tree mark, leaving about 50 percent of the trees will also provide additional resource protection. Soils mapped in the west end of the unit are relatively deep and somewhat erodible. Areas disturbed during logging should be revegetated as soon as possible to prevent erosion (BMP 12.17).

Fisheries
A single-tree selection and group silvicultural prescription for Unit 11 will leave about 50 percent of the trees in the unit, providing a reasonable assurance of windfirmness to the no-cut buffers along Class III streams.

Class III HC6 adjacent to east unit boundary: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class III HC5 flows north through unit: no timber harvest within the V-notch, manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class IV HC5 adjacent to southwest unit boundary. Directional felling required.

Class IV HC5 crosses tip of north unit boundary. Directional felling may be required.

Follow BMPs 12.6, 12.6a and 13.16.

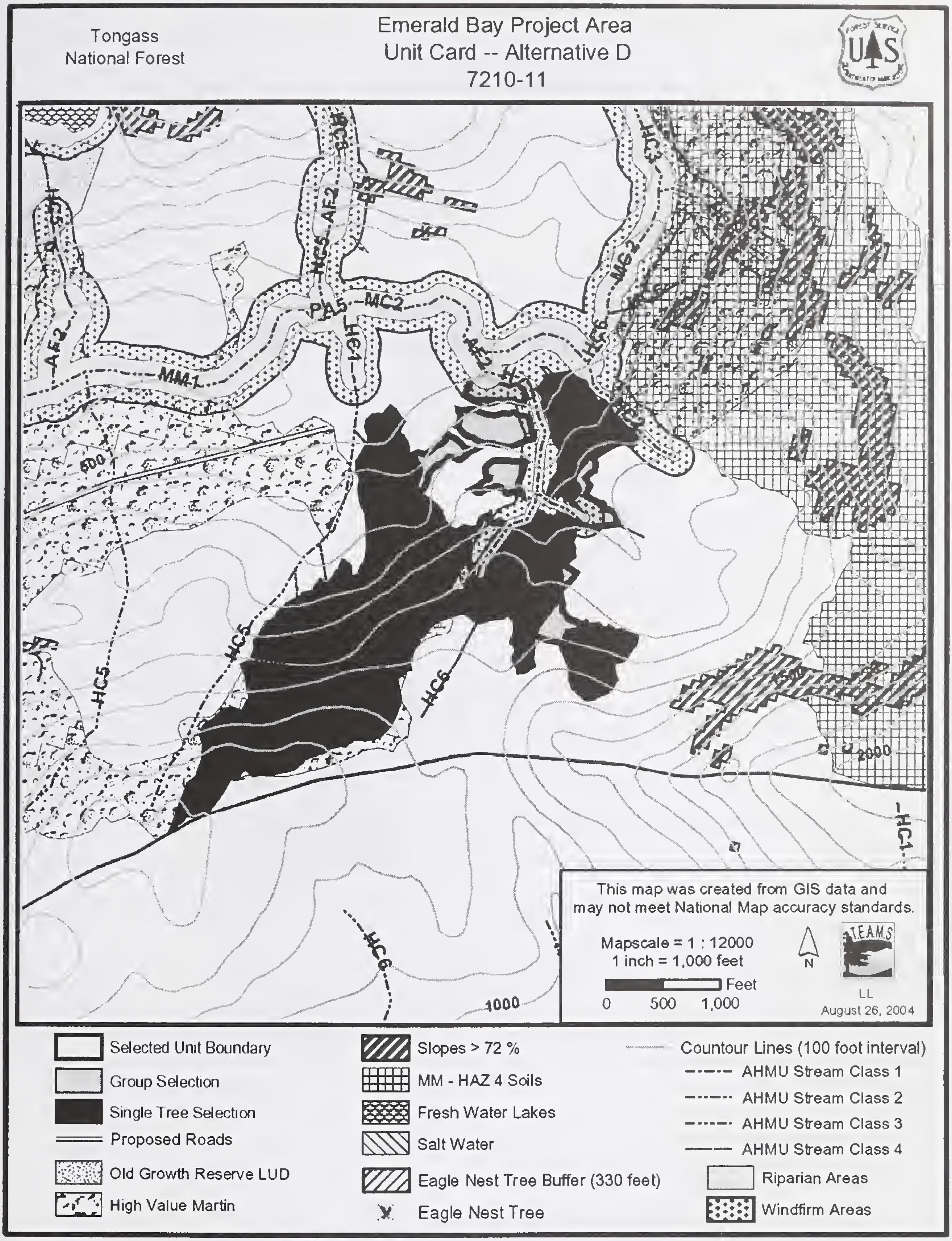
Silvicultural Prescription (Single-tree & Group Selection)
Use single-tree selection to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

B. All hemlock 0-14 inches dbh and over 40 inches dbh.

Harvest 17 acres using group selection removing all merchantable trees from areas ranging from 1/4 to 2 acres in size. Leave at least 200 feet between groups.

Logging System and Unit Design
Helicopter harvest to a barge in Emerald Bay.



Tongass
National Forest
Emerald Bay Project Area
Unit Card -- Alternative D
7210-11
This map was created from GIS data and may not meet National Map accuracy standards.
Mapscale = 1 : 12000
1 inch = 1,000 feet
N
Feet
0 500 1,000
LL
August 26, 2004
Selected Unit Boundary
Group Selection
Single Tree Selection
Proposed Roads
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative D Unit Card

Unit 11

Harvest Acres:	119	MBF Volume:	2,186	CCF Volume:	4,651
Aerial Photo:	1973	Flight #:	29	Photo #:	31

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 45 acres of high value marten habitat to be treated with single-tree selection. (W28)

Scenery
No impacts to visual quality are anticipated.

Wetlands
No concerns.

Soils
Slopes are predominantly less than 60 percent gradient within unit and no slopes over 72 percent were identified. The mass movement index ranges from low to high in the unit. Helicopter yarding along with single-tree selection prescription will provide adequate resource protection (BMP 13.9). Soils mapped in the west end of the unit are relatively deep and somewhat erodible. Areas disturbed during logging should be covered with slash and grass seeded to minimize erosion until natural regeneration occurs. (BMP 12.17). (F18)

Fisheries/Hydrology
Class III HC6 adjacent to northeast unit boundary: no timber harvest within the V-notch. (F1, F2)
Class III HC5 flows north through unit: no timber harvest within the V-notch. Slope break buffer required. (F1, F2)
Class IV HC5 adjacent to west unit boundary. Directional felling required. (F3)
Class III HC5 tributary to the Class III HC5 flows north through unit. Slope break buffer required. (F1, F2)
Class IV HC5 which is the upper reaches Class III HC5 flows north through unit. Directional felling required. (F3)
Class IV HC5 upper reaches of the tributary of the Class III HC5 flows north through the unit. Directional felling required. (F3)
Class IV HC5 northernmost tributary of the Class IV HC5 which follows western boundary. Directional felling where practical. (F3)
Class IV HC5 center tributary of the Class IV HC5 which follows the western boundary. Directional felling where practical. (F3)
Class IV HC5 the southern most tributary of the Class IV HC5 which follows the western boundary. Directional felling where practical. (F3)

Silvicultural Prescription (Single-tree and Group Selection)
Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system. Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:

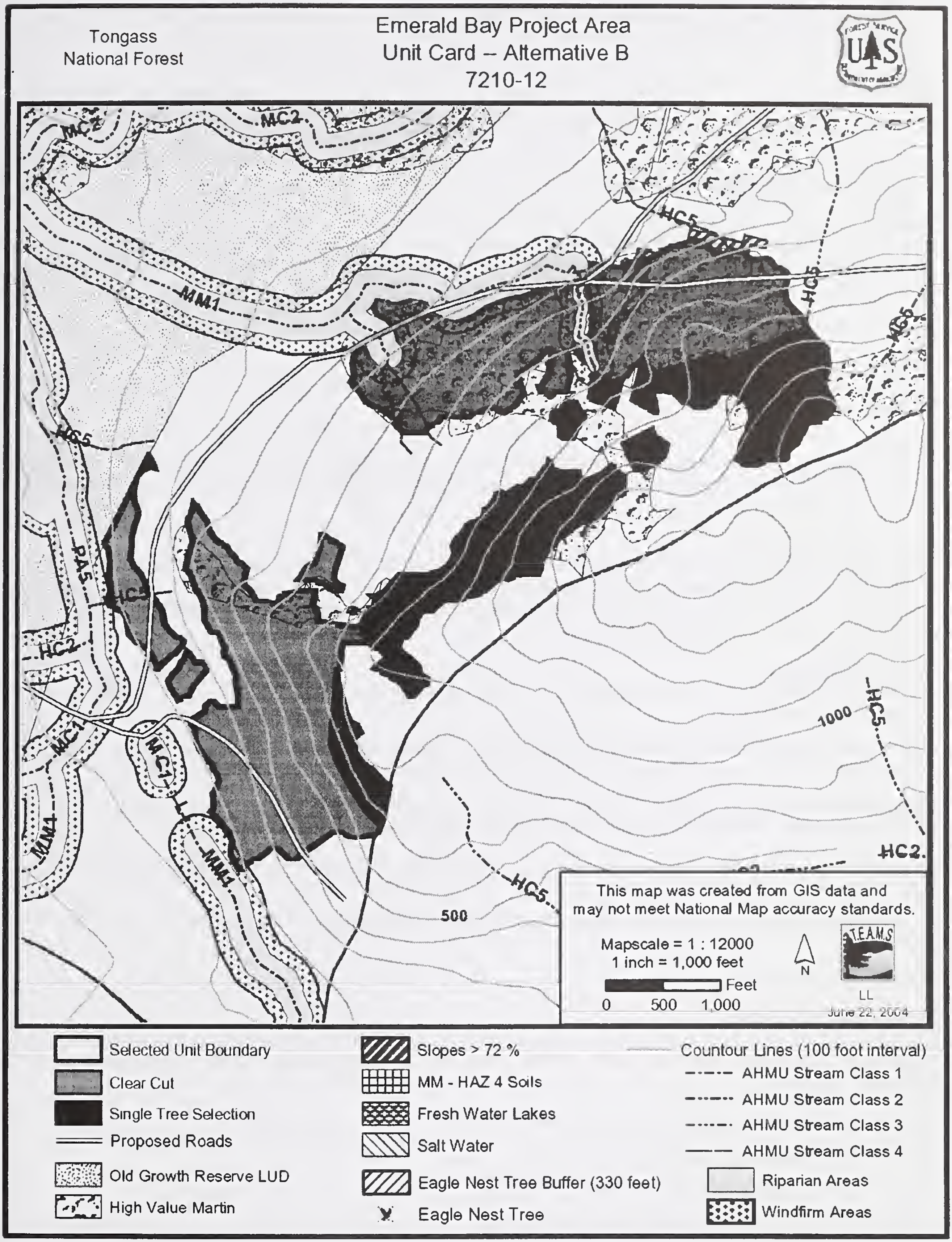
Single-tree Selection (102 acres)

Use single-tree selection to remove all trees as described below:
A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

Group Selection will be applied to eight areas (17 acres).

Target basal area will be removed in groups, the resulting openings not to exceed 2 acres in size.

Logging System and Unit Design
Helicopter harvest to road.



Tongass
National Forest
Emerald Bay Project Area
Unit Card -- Alternative B
7210-12
MC2
MM1
HC5
HC2
PA5
MC1
MM4
1000
500
This map was created from GIS data and may not meet National Map accuracy standards.
Mapscale = 1 : 12000
1 inch = 1,000 feet
N
Feet
0 500 1,000
T.E.A.M.S
LL
June 22, 2004
Selected Unit Boundary
Clear Cut
Single Tree Selection
Proposed Roads
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative B Unit Card

Unit 12

Harvest Acres:	208	MBF Volume:	5776	CCF Volume:	11552
Aerial Photo:	1973	Flight #:	28	Photo #:	217

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 106 acres of high value marten habitat; 76 acres to be clearcut and 30 acres of single-tree selection. Marten guidelines to apply in clearcut area: maintain 10-20 percent of original stand structure, average 4 large trees/acre (20-30"+), average 3 snags per acre, average 3 pieces downed logs/acre (20-30"+). (W28)

Modify the unit boundary to exclude brown bear foraging habitat.

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
The unit boundary has been modified to avoid timber harvest on forested organic soils per the TLMP ROD. The southern quarter of Unit 12 lies on Forested Wetlands. Partial suspension is required (BMP 12.5 &13.9). Most of the unit is underlain by well-drained upland soils.

Landslide Prone Soils
Slopes in Unit 12 range from 20 up to 70 percent gradient. No slopes over 72 percent were identifiied. The landslide potential ranges from low to high. Partial suspension is required to mitigate landslide and erosion potential (BMP 13.9). Soils under much of the unit are deep and somewhat erodible. Revegetation of any areas disturbed during yarding should be completed as soon as possible (BMP 12.17).

Fisheries/Hydrology
A Class I stream with a pond and short sedge wetland drains the west end of the unit. The short sedge wetland is part of the riparian area around the pond.

Class 1 MC1 adjacent to west boundary: no harvest within the greater of 100 feet or the channel sideslope break required, manage a reasonable distance (site potential tree height is 100 feet) beyond the slopebreak for windfirmness.

Class I PA5 adjacent to west boundary: greater of 100 foot or RMA buffer required; manage a reasonable distance (site potential tree height is 85 feet) beyond the slopebreak for windfirmness.

Class I MM1 adjacent to west boundary: greater of 120 feet or RMA buffer required; manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class IV HC5 (two) flow through northern part of unit. Directional felling, split yarding, and full suspension may be required.

Follow BMPs 12.6, and 13.16.

Silvicultural Prescription
Use single-tree selection on 61 acres to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

B. All hemlock 0-14 inches dbh and over 40 inches dbh.

Clearcut and clearcut with reserves the remainder of the unit.

Clearcut is the optimum method of harvest where prescribed: Lands proposed for clearcut are in the Timber Production LUD where a management goal is to maintain and promote industrial wood production (USDA FS 2001). Clearcutting is a

recommended harvest where timber production is the primary purpose because logging costs are lower than with other systems; site exposure to the sun raises soil temperature, which speeds decomposition of mor, thereby improving site productivity; clearcutting favors the regeneration of Sitka spruce, a desireable timber species; the thin bark and shallow roots of hemlock and spruce make them susceptible to logging injury, which leads to decay, especially in hemlock, and clearcutting minimizes this damage and volume loss (Burns, R. 1983).

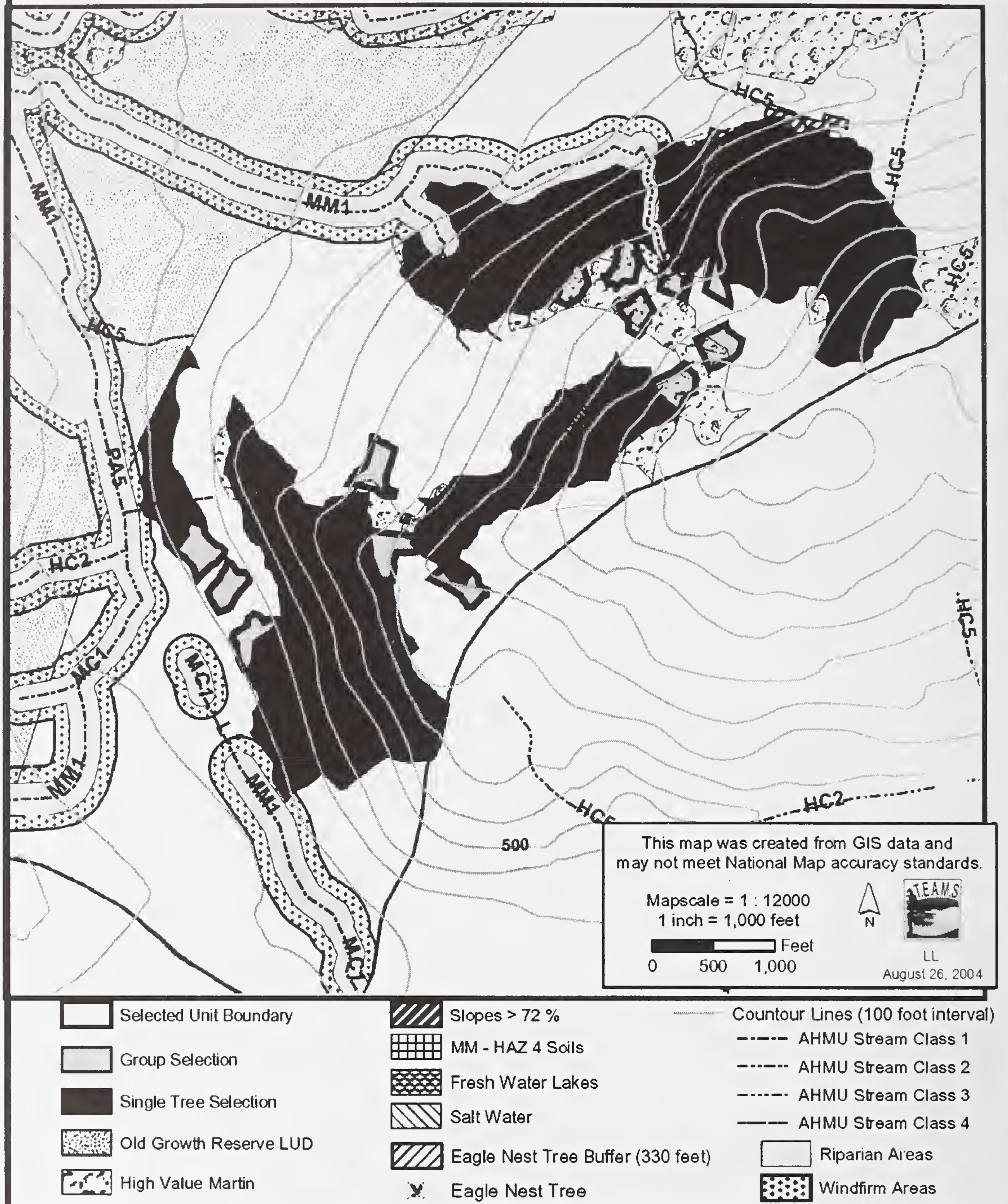
Logging System and Unit Design

Helicopter yard 84 acres to the road.

Cable yard the remainder of the unit.

Tongass
National Forest

Emerald Bay Project Area
Unit Card -- Alternative C
7210-12



Emerald Bay Project Alternative C Unit Card

Unit 12

Harvest Acres: 208 MBF Volume: 3655 CCF Volume: 7310
Aerial Photo: 1973 Flight #: 28 Photo #: 217

Resource Concerns and Mitigation

Wildlife
This unit unit incudes 106 acres of high value marten habitat; 98 acres of single-tree selection and 8 acres of group selection. Marten guidelines to apply in group selection area: limit the number of openings to an equivalent of 25 percent of the stand removed every 50 years. (W28)

Modify the unit boundary to exclude brown bear foraging habitat.

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
The unit boundary has been modified to avoid timber harvest on forested organic soils per the TLMP ROD. The southern quarter of Unit 12 lies on Forested Wetlands. Partial suspension is required (BMP12.5 & 13.9). Full suspension with partial harvest will provide additional protection to the wetlands resource. Most of the unit is underlain by well-drained upland soils.

Landslide Prone Soils
Slopes in Unit 12 range from 20 up to 70 percent gradient. No slopes over 72 percent were identified. The landslide potential ranges from low to high. Partial suspension is required to mitigate landslide and erosion potential (BMP 13.9). Full suspension with a partial harvest prescription will provide additional resource protection. Soils under much of the unit area are deep and somewhat erodible. Revegetation of any areas disturbed during yarding should be completed as soon as possible (BMP 12.17).

Fisheries
A Class I stream with a pond and short sedge wetland drains the west end of the unit. The short sedge wetland is part of the riparian area around the pond.

Class 1 MC1 adjacent to west boundary: no harvest within the greater of 100 feet or the channel sideslope break required, manage a reasonable distance (site potential tree height is 100 feet) beyond the slopebreak for windfirmness.

Class I PA5 adjacent to west boundary: greater of 100 foot or RMA buffer required; manage a reasonable distance (site potential tree height is 85 feet) beyond the slopebreak for windfirmness.

Class I MM1 adjacent to west boundary: greater of 120 feet or RMA buffer required; manage a reasonable distance (site potential tree height is 120 feet) beyond the slopebreak for windfirmness.

Class IV HC5 (two) flow through northern part of unit. Directional felling, split yarding, and full suspension may be required.

Follow BMPs 12.6, and 13.16.

Silvicultural Prescription (Single-tree & Group Selection)
Use single-tree selection on 186 acres to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

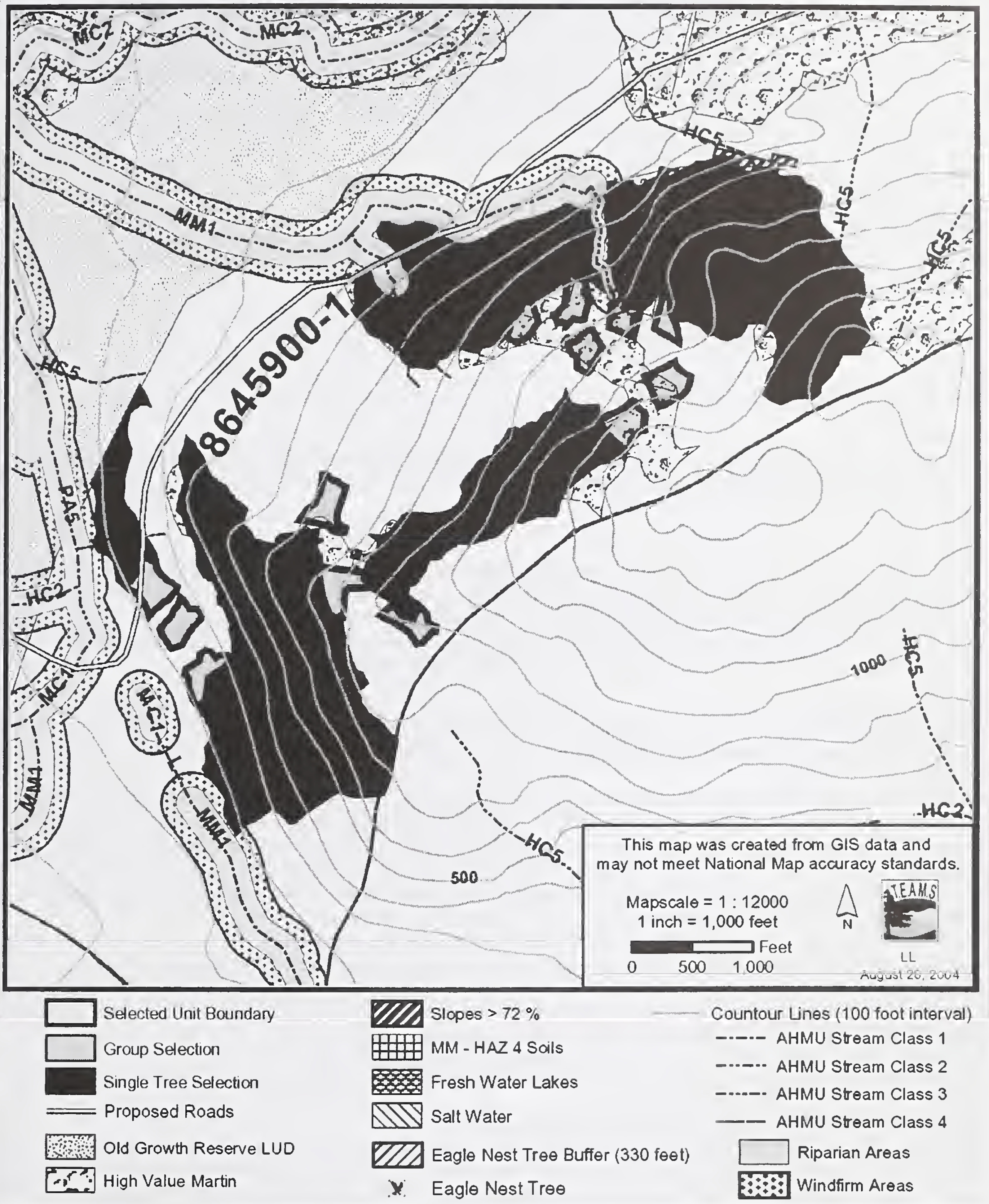
B. All hemlock 0-14 inches dbh and over 40 inches dbh.

Harvest 22 acres using group selection removing all merchantable trees from areas ranging from 1/4 to 2 acres in size. Leave at least 200 feet between groups.

Logging System and Unit Design
Helicopter harvest to a barge in Emerald Bay.

Tongass National Forest

Emerald Bay Project Area
Unit Card -- Alternative D
7210-12



Emerald Bay Project Alternative D Unit Card

Unit 12

Harvest Acres:	208	MBF Volume:	3,745	CCF Volume:	7,967
Aerial Photo:	1973	Flight #:	28	Photo #:	217

Resource Concerns and Mitigation

Wildlife

This unit unit incudes 106 acres of high value marten habitat; 98 acres of single-tree selection and 8 acres of group selection. Marten guidelines to apply in group selection area: limit the number of openings to an equivalent of 25 percent of the stand removed every 50 years. (W28)

Modify the unit boundary to exclude brown bear foraging habitat.

Scenery

No impacts to visual quality are anticipated.

Wetlands

The southern quarter of the unit lies on Forested Wetlands. Most of the unit is underlain by well-drained upland soils. Helicopter yarding in conjunction with single-tree selection prescription will provide protection to the wetlands resource (BMP 12.5 and 13.9). (F11)

Soils

Slopes within unit range from 20 percent to 70 percent gradient. No slopes over 72 percent were identified. The landslide potential ranges from low to high. Helicopter yarding in conjunction with single-tree selection prescription will mitigate landslide and erosion potential (BMP 13.9). Should any cable yarding systems be used, partial suspension requirements are to be implemented. Soils under much of the unit area are deep and somewhat erodible. Revegetation of any areas disturbed during yarding should be completed as soon as possible (BMP 12.17). (F18)

Fisheries/Hydrology

Class I MC1 Emerald Creek lower reach adjacent to west boundary: no harvest within the greater of 100 feet or the channel sideslope break required, manage a reasonable distance of one potential site tree height (~100 feet) beyond the slopebreak for windfirmness. (F1, F2)
Class I PA5 Emerald Creek middle reach adjacent to west boundary: greater of 100 foot or RMA buffer required; manage a reasonable distance of one potential site tree height (~ 85 feet) beyond the slopebreak for windfirmness. (F1, F2)
Class I MM1 Emerald Creek upper reach adjacent to west boundary: greater of 120 feet or RMA buffer required; manage a reasonable distance of one potential site tree height (~120 feet) beyond the slopebreak for windfirmness. (F1, F2)
Class IV MC5 tributary to Emerald Creek flows through western portion of unit. Directional felling where practical. (F3)
Class II MM1 parallel to the north boundary: 100 foot no-cut buffer required. (F1, F2)
Class II MM1 tributary to Class II MM1: 120 foot no-cut buffer required. (F1, F2)
Class III HC5 upper reach of Class II MM1 parallel to north boundary. Slope break buffer required. (F1, F2)
Class IV HC5 eastern upper reach of Class II MM1, that exists at NW tip of unit. Directional felling where practical. (F3)
Class IV HC5 western upper reach of Class II MM1, that exists at NW tip of unit. Directional felling where practical. (F3)
Class IV HC5 upper reach of Class III HC5. Slope break buffer required. (F19, F2)
Class IV HC5 exits northern tip of unit. Directional felling where practical. (F3)
Class IV HC5 bisects eastern most portion of unit. Directional felling where practical. Follow BMPs 12.6, and 13.16. (F3)

Silvicultural Prescription (Single-tree and Group Selection)

Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system. Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:

Single-tree Selection (186 acres)

Use single-tree selection to remove all trees as described below:

A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

Group Selection will be applied to ten areas (22 acres).

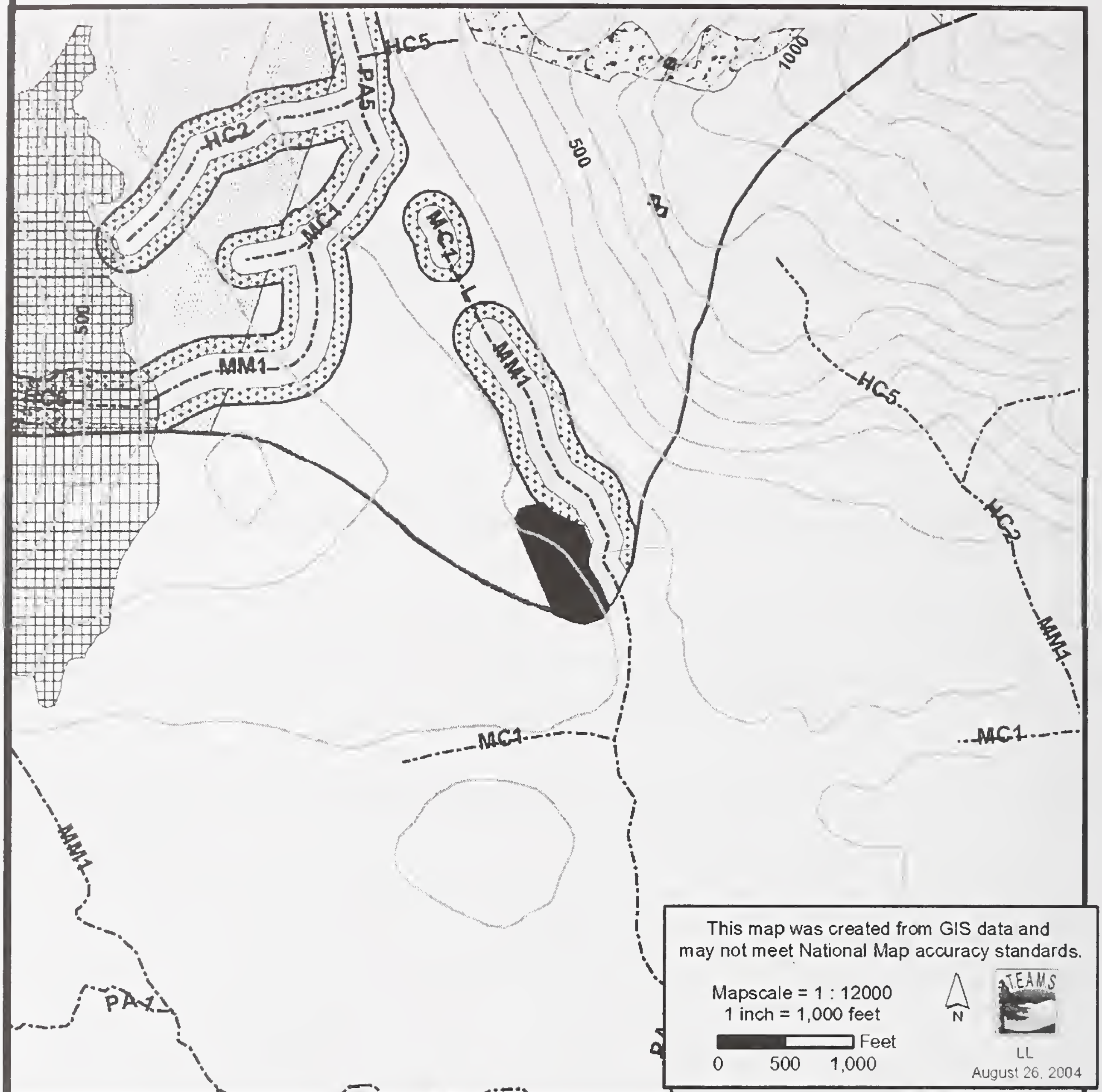
- Target basal area will be removed in groups, the resulting openings not to exceed 2 acres in size.

Logging System and Unit Design

Unit will be helicopter harvested.

Tongass
National Forest

Emerald Bay Project Area
Unit Card -- Alternative C
7210-13



Selected Unit Boundary
Group Selection
Single Tree Selection
Old Growth Reserve LUD
High Value Martin
Slopes > 72 %
MM - HAZ 4 Soils
Fresh Water Lakes
Salt Water
Eagle Nest Tree Buffer (330 feet)
Eagle Nest Tree
Countour Lines (100 foot interval)
AHMU Stream Class 1
AHMU Stream Class 2
AHMU Stream Class 3
AHMU Stream Class 4
Riparian Areas
Windfirm Areas

Emerald Bay Project Alternative C Unit Card

Unit 13

Harvest Acres:	7	MBF Volume:	72	CCF Volume:	144
Aerial Photo:	1973	Flight #:	28	Photo #:	218

Resource Concerns and Mitigation

Wildlife

Scenery
This unit as designed meets the Forest Plan visual objective of maximum modification as viewed in the middleground from the Ernest Sound visual priority route.

Wetlands
About 3 acres of forested wetlands occur in Unit 13. A minimum of partial suspension is required. Full suspension via helicopter yarding and a partial harvest prescription will provide additional protection to the wetland resources (BMP 12.5 and 13.9).

Landslide Prone Soils
Slopes in Unit 13 are less than 30 percent gradient. Landslide potential is low.

Fisheries/Hydrology
The partial harvest prescription will provide a reasonable assurance of windfirmness to the no-cut buffers on the stream on the east side of the unit.

Class II MM1 next to northeast unit boundary: greater of 120 foot or RMA buffer required, additional 120 foot select harvest windfirm buffer required.

Class II MC2 next to east unit boundary: no harvest within the greater of 100 feet or the channel sideslope break required; manage a reasonable distance (site potential tree height is 100 feet) beyond the slopebreak for windfirmness.

Follow BMPs 12.6, 12.6a and 13.16.

Silvicultural Prescription (Single-tree Selection)
Use single-tree slection to remove approximately 50 percent of the merchantable volume using a prescription similar to that listed below. Final prescriptions will be prepared following further field inventory and summarized in Record of Decision unit cards.

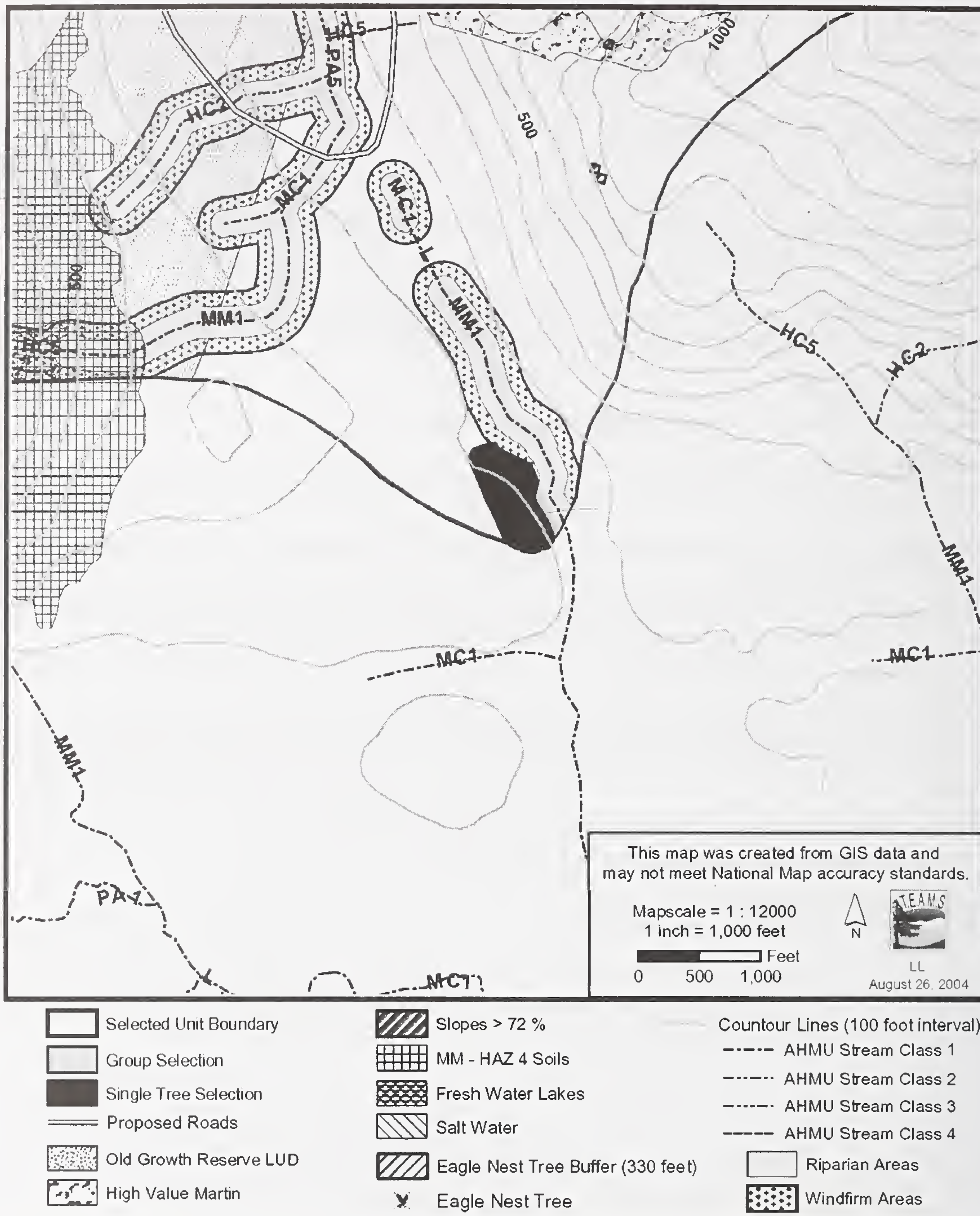
Leave: A. All Western Redcedar, Sitka Spruce and Alaska Yellowcedar 0-22 inches dbh.

B. All hemlock 0-14 inches dbh and over 40 inches dbh.

Logging System and Unit Design
Helicopter harvest to a barge in Emerald Bay.

Tongass
National Forest

Emerald Bay Project Area
Unit Card -- Alternative D
7210-13



Emerald Bay Project Alternative D Unit Card

Unit 13

Harvest Acres:	7	MBF Volume:	125	CCF Volume:	267
Aerial Photo:	1973	Flight #:	28	Photo #:	218

Resource Concerns and Mitigation

Wildlife

Scenery
No impacts to visual quality are anticipated.

Wetlands
About 3 acres of Forested Wetlands occur in unit. Helicopter yarding in conjunction with single-tree selection prescription will provide adequate protection to the wetland resources (BMP 12.5 and 13.9). (F11)

Soils
Slopes within unit are less than 30 percent gradient. Landslide potential is low.

Fisheries
Class I MC2 next to east unit boundary: no harvest within the greater of 100 feet or the channel sideslope break required. (F1, F2)

Silvicultural Prescription (Single-tree Selection)
Stands will be managed to develop and then maintain a distribution of diameter classes typical of an uneven-aged system.

Removal will be limited to roughly 50-60 percent of existing basal area per entry, with future entries scheduled between 50 and 100 years following initial harvest. Stand examination data was used to stratify units by species and basal area. Three stratifications were developed and a separate prescription applied to each strata. For this unit the following prescription(s) will be applied:

Use single-tree selection to remove all trees as described below:
A. All trees between 16 and 24 inches in diameter.
B. All trees between 34 and 44 inches in diameter.

Logging System and Unit Design
Helicopter harvest to road.

Appendix E

Road Cards

Appendix E

Road Cards

General Mitigation Measures

The general measures described in Introduction to Appendix D, Unit Cards, apply to all units and roads in the Emerald Bay project. The source(s) of each general measure are listed after the measure in terms of individual Forest-wide Standards and Guidelines (see Chapter 4 of the Forest Plan) or BMPs (see Appendix C of the Forest Plan and Chapter 10 of FSH 2509.22, The Soil and Water Conservation Handbook). Measures with application to a particular road are listed on the individual road cards as Site-specific Design Criteria.

General Design Criteria and Elements are shown on the Road Management Objectives portion of the road cards and are defined as follows:

- Functional Class: Local, Collector, and Arterial classifications
- Service Life: Long or Short, Constant or Intermittent, consistent with NEPA disclosure document.
- Traffic Service Level: Traffic Service Level anticipated for the design (A, B, C, D) that takes into consideration the characteristics of the road and operating conditions.

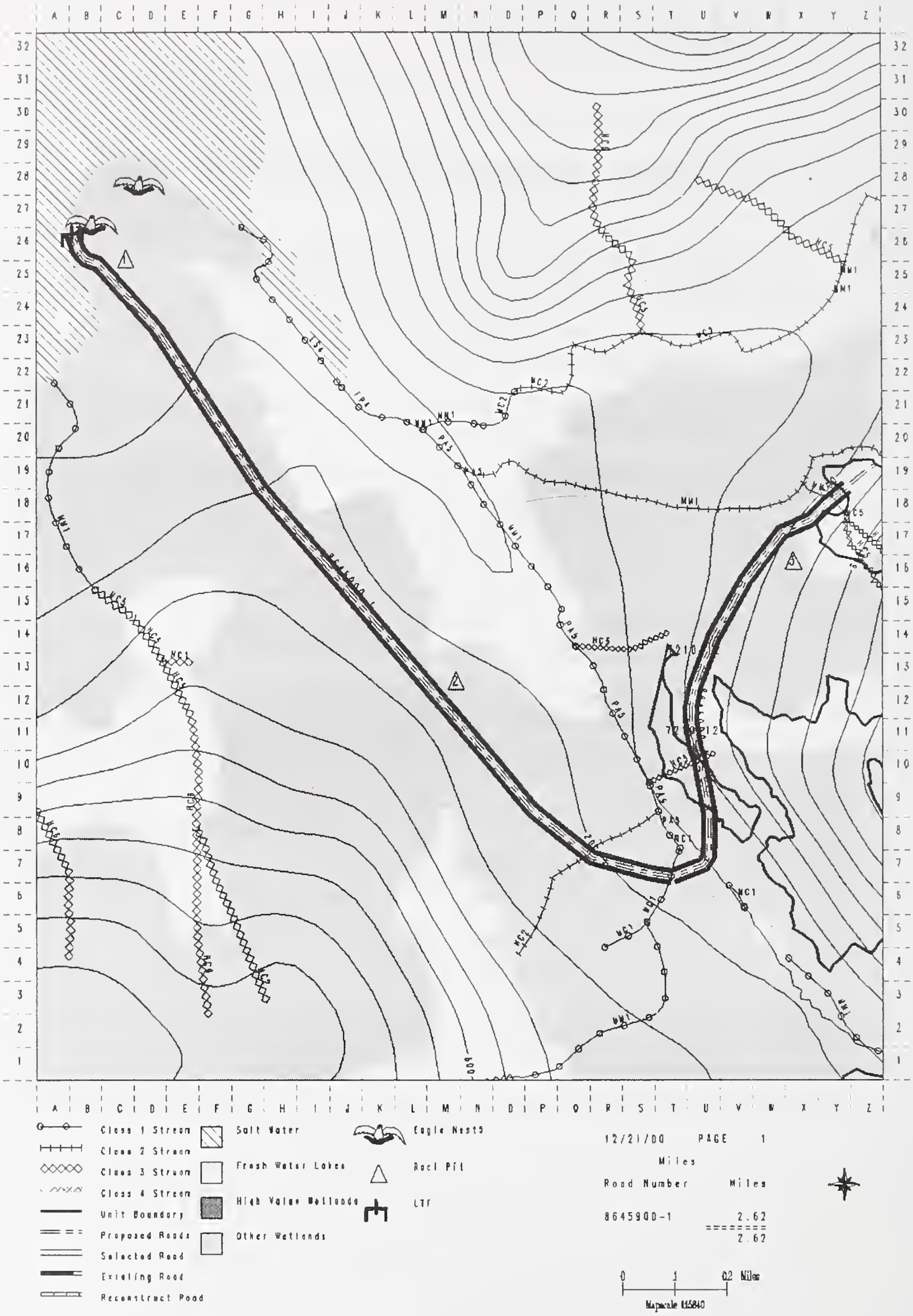
Operational Maintenance Levels incorporate traffic service levels, as indicated in the following definitions. Applicable maintenance levels for the project area are:

- Maintenance Level 1 (Traffic Service Level D) - Roads are closed by bridge removal or organic encroachment and are monitored for resource protection. Basic custodial maintenance is performed to perpetuate the road and to facilitate future management activities.
- Maintenance Level 2 (Traffic Service Level C) - Roads are maintained for high-clearance vehicles and monitored for resource protection. Traffic would be minor, consisting of administrative uses.

AFRPR Status: Alaska Forest Resource Protection Regulations.

Emerald Bay Alternative B and D Road Card

Emerald Bay Project Area Rod Road Card 8645900-1



Road Management Objectives

Road No. 8645900-1

Project/EIS	System	Land Use Designation
Emerald Bay	Cleveland Peninsula	TM/OGR
Route No.	**Route Name**	**Status**
8645900-1	Emerald	New construction

Begin M.P.	Length	Begin Termini	End Termini
0.00	2.74	0.00	2.74

General Design Criteria and Elements

Functional Class	Service Life	Traffic Service Level	Surface	Width	Critical Vehicle	Design Vehicle	Design Speed
L	LI	D	Rock	14	Log truck	Log truck	10

Intended Purpose/Future Use: Silvicultural activities

Maintenance Criteria

Operational Maintenance Level: 2 **Objective Maintenance Level:** 1

Maintenance Narrative:

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership **AFRPR Status:** Closed

Travel Management Strategies

Encourage:	N/A
Accept:	Hikers, Bicycles
Discourage:	ATV (waterbars, pull bridges)
Prohibit:	N/A
Eliminate:	N/A

Travel Management Narrative: Remove all bridges and drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

District Ranger Approval (signature) ______________________ **Date:** ______________

Road Management Objectives

Site Specific Design Criteria

Road No. 8645900-1

Road Location: Road accesses Units 1 and 12. Road construction should be moderate to easy over most portions of the road. Road located to accommodate logging systems and still have least impact on the other resources. There are no sections where road location crosses steep slopes over 67 percent. Log Transfer Facility (LTF) is located on this road. Road constructed to be minimal impact, 14 feet wide, outsloped with no ditch except in turnpike areas. Drainage crossing shall be with log stringer bridges, culverts used on crossdrain areas only.

Wetlands: Approximately 60 percent of this section of the 8645900 road is located on wetlands. Wetlands are unavoidable while avoiding the floodplain and adjacent sloping ground (BMP 12.5 and 14.2 and CFR BMP 1). The wetlands crossed are a complex of forested wetlands, scrub-shrub evergreen wetlands, and poor fens. A rock pit will likely need to be developed on a wetland site as upland sites are not available (BMP 14.2 and CFR BMP 4 and 5). Few cross drains will be necessary on the first mile of road as it is located on a topographic rise (BMP 14.2). The road is planned for closure following harvest by means of removing all drainage structures (BMP 14.22 and CFR BMPs 2 and 7). Closure should be adequate to discourage ATVs from crossing streams and wetlands. This road meets the requirements for the silvicultural exemption from the 404 permitting process.

Road location was completed to avoid wetlands, although wetlands were unavoidable on approximately 60 percent of the entire length of the proposed road due to safety considerations, engineering design constraints and considerations for other resources.

Erosion Control: An erosion control plan for construction and maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMP 12.17 and 14.8).

Rock Pits: As shown on the map, no major concerns. Timing will be required on all pit and road right-of-way blasting within ½ mile of known eagle nests.

Resource Information (If applicable):

Timber/Logging Systems: Low-impact road design to shorten helicopter yarding distances.

Soils/Water: Road crosses wetlands on gentle slopes for approximately 60 percent of its length (BMP 14.7). Apply BMPs 12.5 and 14.2 and CFR BMPs 1, 2, 5, 6, 7, and 14. Keep clearing widths narrow outside of harvest units (CFR BMP 6). Use BMP 14.12 to control excavation of sidecast material and overburden from the rock pit.

Silviculture: No impacts to silvicultural prescriptions are anticipated.

Lands/Minerals/Geology/Karst: No impacts are anticipated.

Wildlife: Road crosses medium Old-growth Reserve, estuary buffer and eagle nest buffer.

Visual/Recreation: No impacts to visual quality are anticipated.

Cultural: If any cultural resource sites are encountered, activities are to stop in the vicinity of the find and notify the archaeologist.

Road Management Objectives

Stream Crossings

Road No. 8645900-1

A.) M.P. 1.47 AHMU Class II Channel Type: HC2 BF Width: 0.8 m BF Depth: 20 cm Substrate: bdrk
Gradient: 12% Structure: log stringer Passage Req'd.: yes Timing Dates: none
Narrative:

B.) M.P. 1.62 AHMU Class I Channel Type: MC1 BF Width: 0.5 m BF Depth: 15 cm Substrate: cobbles
Gradient: 10% Structure: log stringer Passage Req'd.: yes Timing Dates: June 15 to August 7
Narrative:

C.) M.P. 1.70 AHMU Class I Channel Type: MC1 BF Width: 0.5 m BF Depth: 15 cm Substrate: bdrk
Gradient: 12% Structure: log stringer Passage Req'd.: yes Timing Dates: none
Narrative:

D.) M.P. 1.70 AHMU Class IV Channel Type: HC3 BF Width: 0.3 m BF Depth: 5 cm Substrate: bdrk
Gradient: 19% Structure: log stringer Passage Req'd.: no Timing Dates: none
Narrative:

E.) M.P. 2.45 AHMU Class II Channel Type: MC1 BF Width: 0.5 m BF Depth: 15 cm Substrate: bdrk
Gradient: 6-8% Structure: log stringer Passage Req'd.: yes Timing Dates: none
Narrative:

Emerald Bay Alternative B Road Card

Road Management Objectives

Road No. 8645900-2

Project/EIS	System	Land Use Designation
Emerald Bay	Cleveland Peninsula	TM
Route No.	**Route Name**	**Status**
8645900-2	Ruby	New construction

Begin M.P.	Length	Begin Termini	End Termini
0.00	1.56	2.74	4.30

General Design Criteria and Elements

Functional Class	Service Life	Traffic Service Level	Surface	Width	Critical Vehicle	Design Vehicle	Design Speed
L	LI	D	Rock	14	Log truck	Log truck	10

Intended Purpose/Future Use: Silvicultural activities

Maintenance Criteria

Operational Maintenance Level 2 **Objective Maintenance Level** 1

Maintenance Narrative:

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership **AFRPR Status:** closed

Travel Management Strategies

Encourage:	N/A
Accept:	Hikers, Bicycles, ORVs
Discourage:	N/A
Prohibit:	N/A
Eliminate	N/A

Travel Management Narrative: remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

District Ranger Approval (signature)________________________________**Date:**

Road Management Objectives

Site Specific Design Criteria

Road No. 8645900-2

Road Location: Road accesses units 12, 9, 10, 3. Road construction should be moderate to easy over most portions of the road. Road located to accommodate logging systems and still have least impact on the other resources. There are no sections where road location crosses steep slopes over 67%.

Wetlands: Road 8645900-2 crosses approximately 0.26 miles of forested wetland and 0.64 miles of forested wetland and nonforested non-wetland complex. The wetlands are unavoidable while accessing harvest units (BMP 12.5 and CFR BMPs 1 and 2). Limit excavation of sidecast material to the road corridor (BMP 14.12). The road includes a crossing on Emerald Creek, a Class 2 fish stream. Passage is planned for (CFR BMP 7). Rock pits need to be located outside wetland areas (BMP 12.5 and CFR BMP 8). Minimize clearing widths in wetlands outside harvest units (CFR BMP 5 and 6). Road 8645900-2 is planned for closure following harvest via removal of all drainage structures (BMP 14.22). This road meets the silvicultural exemption from the 404 permitting process.

Road location was completed to avoid wetlands, although wetlands were unavoidable (m.p. 0.40 to 0.43 and 1.40 to 1.49) due to safety considerations, engineering design constraints and considerations for other resources.

Erosion Control: An erosion control plan for construction and maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMP 12.17, 14.8).

Rock Pits: As shown on the map, no major concerns. Timing will be required on all pit and road right-of-way blasting within 1/2 mile of known eagle nests.

Resource Information (If applicable):

Timber/Logging Systems

Soils/Water: Road 8645900-2 traverses relatively stable slopes (BMP 14.2 and 14.7). The crossing on Emerald Creek is in a stable location. Use BMP 14.14 to minimize in-channel operations. The road should be located upslope of the colluvial/alluvial fan formed by the stream between units 3 and 9. (BMP 14.2). Remove drainage structures on this stream following harvest (BMP 14.17 and 14.22). Close road in such a way as to discourage ATV use in and adjacent to streams and wetlands (BMP 14.22).

Silviculture:

Lands/Minerals/Geology/Karst:

Wildlife:

Visual/Recreation:

Cultural: **If any cultural resource sites are encountered, stop activities in the vicinity of the find and notify the archaeologist.**

Road Management Objectives

Stream Crossings

Road No. 8645900-2

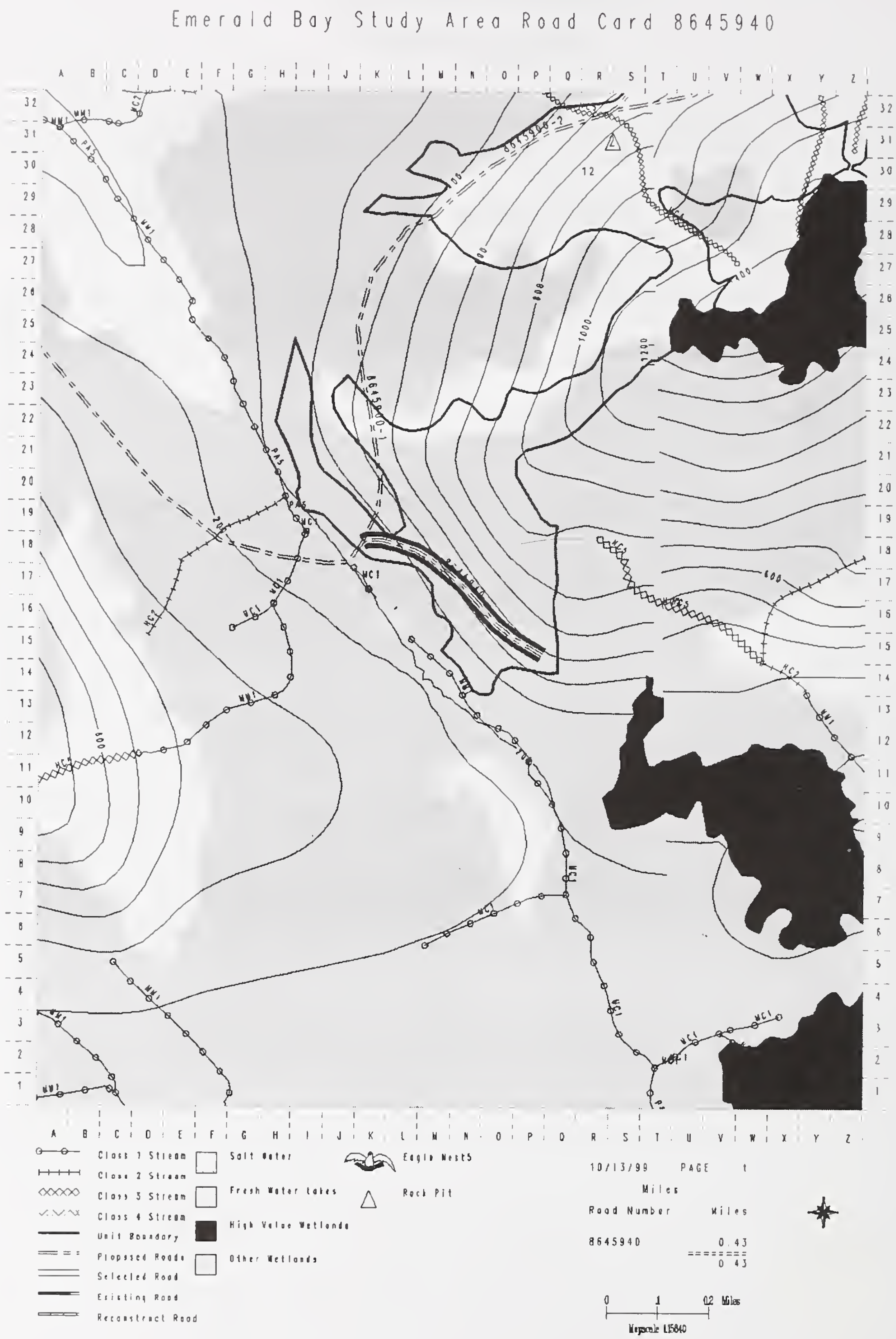
A.) M.P. 0.25 AHMU Class IV Channel Type: HC5 BF Width: 0.4m BF Depth: 3cm Substrate: bdrk
Gradient: 22% Structure 450mm cmp Passage Req'd.: no Timing Dates: none
Narrative: t

B.) M.P. 0.47 AHMU Class IV Channel Type: HC5 BF Width: 0.4m BF Depth: 3cm Substrate: bdrk
Gradient: 22% Structure 450mm cmp Passage Req'd.: no Timing Dates: none
Narrative: t

C.) M.P. 1.05 AHMU Class II Channel Type: MM1 BF Width: 8m BF Depth: 24cm Substrate: cbbles
Gradient: 6% Structure Bridge Passage Req'd.: yes Timing Dates: none
Narrative: t

D.) M.P. 1.49 AHMU Class III Channel Type: HC5 BF Width: 3.0m BF Depth: 3cm Substrate: bdrk
Gradient: 18% Structure 450 mm cmp Passage Req'd.: no Timing Dates: none
Narrative: t

Emerald Bay Alternative B Road Card



Road Management Objectives

Road No. 8645940

Project/EIS	System	Land Use Designation
Emerald Bay	Cleveland Peninsula	TM
Route No.	**Route Name**	**Status**
8645940	Ruby	New construction

Begin M.P.	Length	Begin Termini	End Termini
0.00	0.43	0.00	0.43

General Design Criteria and Elements

Functional Class	Service Life	Traffic Service Level	Surface	Width	Critical Vehicle	Design Vehicle	Design Speed
L	LI	D	Rock	14	Log truck	Log truck	10

Intended Purpose/Future Use: Silvicultural activities

Maintenance Criteria

Operational Maintenance Level 2 **Objective Maintenance Level** 1

Maintenance Narrative:

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership **AFRPR Status:** closed

Travel Management Strategies

Encourage:	N/A
Accept:	Hikers, Bicycles, ORVs
Discourage:	N/A
Prohibit:	N/A
Eliminate	N/A

Travel Management Narrative: remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

District Ranger Approval (signature)______________________________________**Date:**

Road Management Objectives

Site Specific Design Criteria

Road No. 8645940

Road Location: Road accesses unit 12 (south end). Road construction should be moderate to easy over most portions of the road. Road located to accommodate logging systems and still have least impact on the other resources. There are no sections where road location crosses steep slopes over 67% .

Wetlands: Road 8645940 is located entirely on forested wetlands within unit 12. The wetlands are part of the harvest unit and unavoidable (BMP 12.5 and 14.2 and CFR BMP 1 and 2). Borrow material may need to come from a rock pit in wetlands, the same pit that serves the 8645900-1 (CFR BMP *). Clean fill will be used (CFR BMP 14). Road 8645940 is scheduled to be closed following harvest via removal of all drainage structures (BMP 14.22). This road meets the requirements for the silvicultural exemption from the 404 permitting process.

Road location was completed to avoid wetlands, although wetlands were unavoidable, as the entire proposed road is on designated wetlands, due to safety considerations, engineering design constraints and considerations for other resources.

Erosion Constrol: An erosion control plan for construction and maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMP 12.17, 14.8).

Rock Pits: As shown on the map, no major concerns. Timing will be required on all pit and road right-of-way blasting within 1/2 mile of known eagle nests.

Resource Information (If applicable):

Timber/Logging Systems

Soils/Water: The 8645940 road is located on stable slopes (BMP 14.2 and 14.7). Use BMP 14.12 to keep excavated material out of the riparian area surrounding the pond downslope of the road.

Silviculture:

Lands/Minerals/Geology/Karst:

Wildlife:

Visual/Recreation:

Cultural: **If any cultural resource sites are encountered, stop activities in the vicinity of the find and notify the archaeologist.**

Road Management Objectives

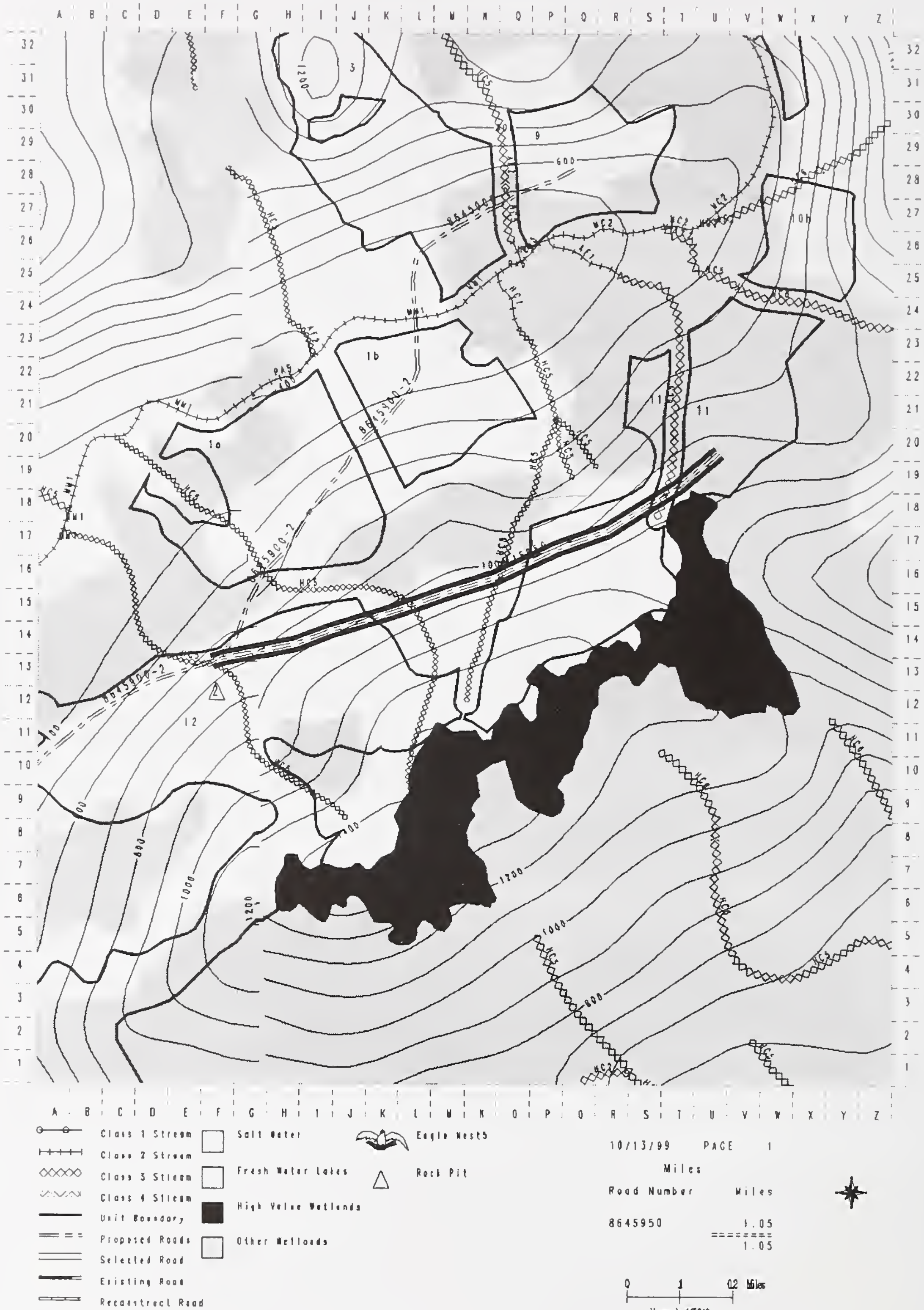
Stream Crossings

Road No. 8645940

No streams encountered on this location.

Emerald Bay Alternative B Road Card

Emerald Bay Study Area Road Card 8645950



Road Management Objectives

Road No. 8645950

Project/EIS	System	Land Use Designation
Emerald Bay	Cleveland Peninsula	TM
Route No.	**Route Name**	**Status**
8645950	Sapphire	New construction

Begin M.P.	Length	Begin Termini	End Termini
0.00	1.05	0.00	1.05

General Design Criteria and Elements

Functional Class	Service Life	Traffic Service Level	Surface	Width	Critical Vehicle	Design Vehicle	Design Speed
L	LI	D	Rock	14	Log truck	Log truck	10

Intended Purpose/Future Use: Silvicultural activities

Maintenance Criteria

Operational Maintenance Level 2 **Objective Maintenance Level** 1

Maintenance Narrative:

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership **AFRPR Status:** closed

Travel Management Strategies

Encourage:	N/A
Accept:	Hikers, Bicycles, ORVs
Discourage:	N/A
Prohibit:	N/A
Eliminate	N/A

Travel Management Narrative: remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

District Ranger Approval (signature)________________________________**Date:**

Road Management Objectives

Site Specific Design Criteria

Road No. 8645950

Road Location: Road accesses unit 11 & 12. Road construction should be moderate to easy over most portions of the road. Road located to accommodate logging systems and still have least impact on the other resources. There are no sections where road location crosses steep slopes over 67% .

Wetlands: Less than 0.1 miles of the 8645950 road are located on forested wetlands in the east end of unit 11. Wetlands were avoided in location (BMP 12.5, 14.2 and CFR BMPs 1 and 2). Road 8645950 is planned for closure following harvest via removal of all drainage structures (BMP 14.22 and CFR BMP 4). Road 8645950 meets the requirements for the silvicultural exemption from the 404 permitting process.

Road location was completed to avoid wetlands, although wetlands were unavoidable (m.p. 0.97 to m.p.1.05), due to safety considerations, engineering design constraints and considerations for other resources.

Erosion Constrol: An erosion control plan for construction and maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMP 12.17, 14.8).

Rock Pits: As shown on the map, no major concerns. Timing will be required on all pit and road right-of-way blasting within 1/2 mile of known eagle nests.

Resource Information (If applicable):

Timber/Logging Systems

Soils/Water: Road 8645950 crosses relatively deep colluvial soils on moderate sideslopes. Use BMPs 14.8, 14.11 and 14.9 to minimize erosion potential. Road closure will involve removal of all drainage structures, and streambanks may need reshaping (BMPs 14.22 and 14.14). Timely grass seeding is important to minimize erosion from this road (BMPs 14.5 and 14.11).

Silviculture:

Lands/Minerals/Geology/Karst:

Wildlife:

Visual/Recreation:

Cultural: **If any cultural resource sites are encountered, stop activities in the vicinity of the find and notify the archaeologist.**

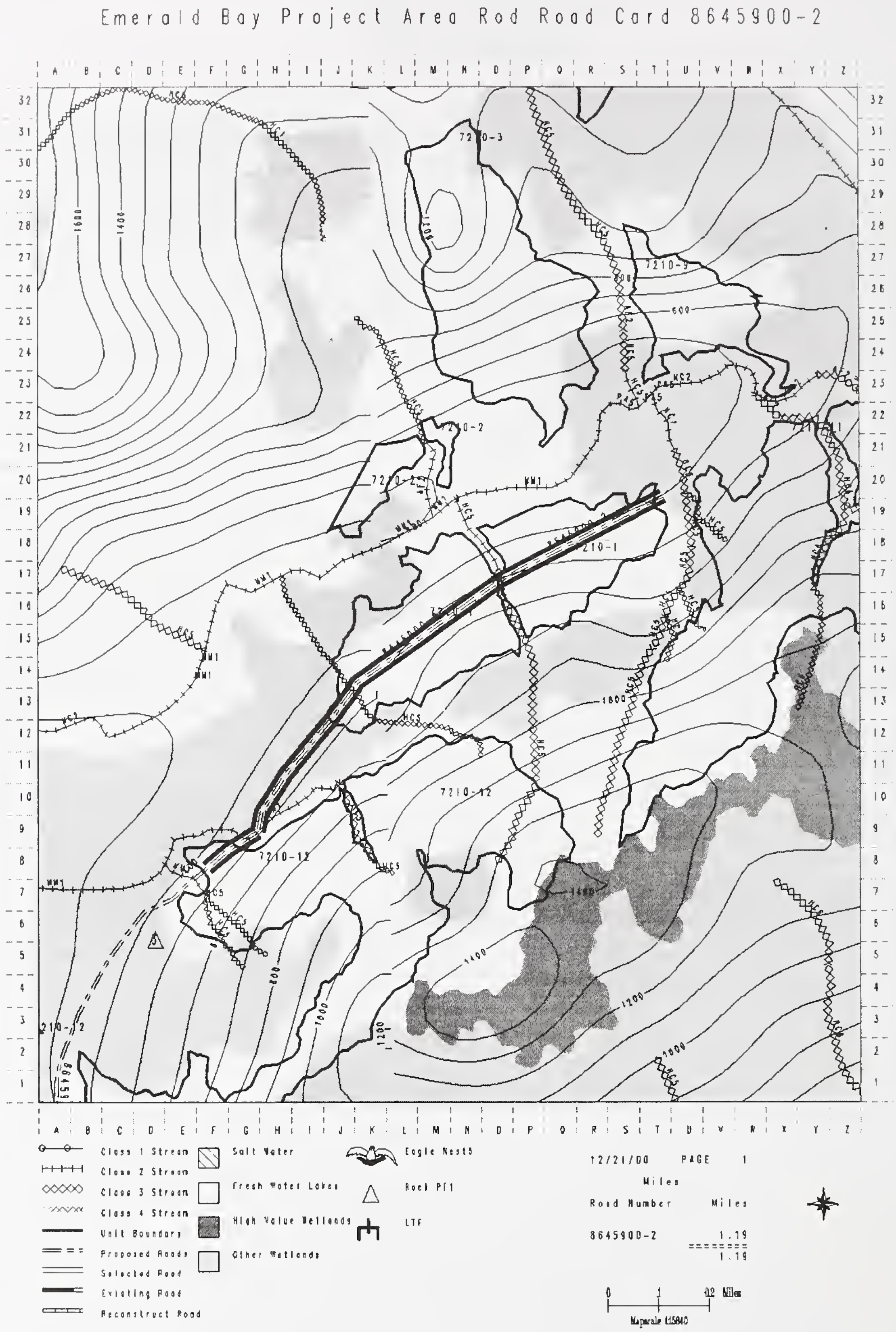
Road Management Objectives

Stream Crossings

Road No. 8645950

A.) M.P. 0.35	AHMU Class IV	Channel Type: HC5	BF Width: 0.4m	BF Depth: 3cm	Substrate: bdrk
Gradient: 22%	Structure 450mm cmp	Passage Req'd.: no		Timing Dates: none	
Narrative:					
B.) M.P. 0.50	AHMU Class IV	Channel Type: HC5	BF Width: 0.4m	BF Depth: 3cm	Substrate: bdrk
Gradient: 22%	Structure 450mm cmp	Passage Req'd.: no		Timing Dates: none	
Narrative:					
C.) M.P. 0.97	AHMU Class III	Channel Type: HC5	BF Width: 1.5m	BF Depth: 4cm	Substrate: bdrk
Gradient: 16%	Structure 1200mm cmp	Passage Req'd.: no		Timing Dates: none	
Narrative:					

Emerald Bay Alternative D Road Card



Road Management Objectives

Road No. 8645900-2

Project/EIS	System	Land Use Designation
Emerald Bay	Cleveland Peninsula	TM
Route No.	**Route Name**	**Status**
8645900-2	Emerald	New construction

Begin M.P.	Length	Begin Termini	End Termini
0.00	1.01	2.74	3.75

General Design Criteria and Elements

Functional Class	Service Life	Traffic Service Level	Surface	Width	Critical Vehicle	Design Vehicle	Design Speed
L	LI	D	Rock	14	Log truck	Log truck	10

Intended Purpose/Future Use: Silvicultural activities

Maintenance Criteria

Operational Maintenance Level: 2 **Objective Maintenance Level:** 1

Maintenance Narrative:

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership **AFRPR Status:** Closed

Travel Management Strategies

Encourage:	N/A
Accept:	Hikers, Bicycles
Discourage:	ATV
Prohibit:	N/A
Eliminate:	N/A

Travel Management Narrative: Remove all bridges and drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

District Ranger Approval (signature) ______________________ **Date:** ______________

Road Management Objectives

Site Specific Design Criteria

Road No. 8645900-2

Road Location: Road accesses Units 1 and 12. Road construction should be moderate to easy over most portions of the road. Road located to accommodate logging systems and still have least impact on the other resources. There are no sections where road location crosses steep slopes over 67 percent. Road to be constructed as a low-impact road. Road constructed to be minimal impact, 14 feet wide, no ditch and outsloped except in turnpike sections. Drainage crossings will be with log stringer structures, corrugated metal pipes (cmps) used for cross drains.

Wetlands: Road crosses approximately 0.26 miles of forested wetland and 0.64 miles of forested wetland and nonforested non-wetland complex. The wetlands are unavoidable while accessing harvest units (BMP 12.5 and CFR BMPs 1 and 2). Limit excavation of sidecast material to the road corridor (BMP 14.12). The road does not cross Birch Creek. Rock pits need to be located outside wetland areas (BMP 12.5 and CFR BMP 8). Minimize clearing widths in wetlands outside harvest units (CFR BMP 5 and 6). Road is planned for closure following harvest by means of removing all drainage structures (BMP 14.22). This road meets the silvicultural exemption from the 404 permitting process.

Road location was completed to avoid wetlands, although wetlands were unavoidable (m.p. 0.40 to 0.43 and 1.40 to 1.49) due to safety considerations, engineering design constraints and considerations for other resources.

Erosion Control: An erosion control plan for construction and maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMP 12.17, 14.8).

Rock Pits: As shown on the map, no major concerns.

Resource Information (If applicable):

> **Timber/Logging Systems:** Road will reduce helicopter yarding distances.
>
> **Soils/Water:** Road traverses relatively stable slopes (BMP 14.2 and 14.7). Remove drainage structures following harvest (BMP 14.17 and 14.22). Close road in such a way as to discourage ATV use in and adjacent to streams and wetlands (BMP 14.22).
>
> **Silviculture:** No impacts to silvicultural prescriptions are anticipated.
>
> **Lands/Minerals/Geology/Karst:** No impacts are anticipated.
>
> **Wildlife:** Road design and closure methods intended to mitigate impacts to wildlife.
>
> **Visual/Recreation:** No impacts to visual quality are anticipated.
>
> **Cultural:** If any cultural resource sites are encountered, stop activities in the vicinity of the find and notify the archaeologist.

Road Management Objectives

Stream Crossings

Road No. 8645900-2

A.) M.P. 0.25 AHMU Class II Channel Type: MM1 BF Width: 0.4 m BF Depth: 10 cm Substrate: bdrk
Gradient: 22% Structure: log stringer Passage Req'd.: yes Timing Dates: none
Narrative:

B.) M.P. 0.47 AHMU Class IV Channel Type: HC5 BF Width: 0.4 m BF Depth: 10 cm Substrate: bdrk
Gradient: 12% Structure: log stringer Passage Req'd.: no Timing Dates: none
Narrative:

C.) M.P. 0.75 AHMU Class IV Channel Type: HC5 BF Width: 0.4 m BF Depth: 0.3 m Substrate: cobbles
Gradient: 6-8% Structure: log stringer Passage Req'd.: yes Timing Dates: none
Narrative:

Federal Recycling Program
Printed on Recycled Paper